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Assessing Stop-Loss Policy Options Through Personnel Flow Modeling

Stephen D. Brady





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Stephen D. Brady

Prepared for the Office of the Secretary of Defense

Approved for public release; distribution unlimited



The research described in this report was prepared for the Office of the Secretary of Defense (OSD). The research was conducted within the RAND National Defense Research Institute, a federally funded research and development center sponsored by OSD, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community under Contract W74V8H-06-C-0002.

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Preface

The practice of stop-loss retains soldiers who are scheduled to end their voluntary terms of active service during an impending or ongoing deployment. These involuntary extensions are legal and have been employed by the U.S. Army over the past two decades. They provide a highly efficient means for meeting the high-priority needs of deployed units. Because stop-loss keeps soldiers in their units, it generally fills deployment needs in the least amount of time possible and minimizes the budgetary impact of added recruitment, training, and personnel reassignment. Besides bolstering head counts with the soldiers who are generally best matched to their deployed jobs, the practice promotes unit personnel stability by helping to keep intact the units that have trained together for missions. It also keeps in check the extended recruitment and reassignment activities needed to maintain a deployed force during periods of extraordinary demand.

The benefits of stop-loss come at an undeniable price. Although the prospect of being extended is a long-standing component of soldiers' voluntary service, the uncertainties and hardships it can place on individuals and families are as problematic for the Army as for affected troops. Stop-loss may also impose indirect costs in the form of psychological and social reactions among those who are stop-lossed, which could be detrimental to cohesion, morale, and other aspects of unit performance. However, the multifaceted challenges of meeting general force needs with trained soldiers have also weighed into the Army's decisions related to stop-loss, and at times the benefits of stop-loss have been deemed essential to the Army's ability to fulfill its mission.

This documented briefing examines a set of alternatives to stop-loss when the Army faces a demanding deployment schedule, as it did during operations in Iraq and Afghanistan. Detailed manpower flow simulations were used to assess specific stop-loss policy proposals proffered in 2008 by the Office of the Secretary of Defense (OSD), focusing on their quantitative effects on deployed-unit fill, personnel stability, and individual deployment tempo for the active enlisted force. To enrich the discussion of the effects of a new stop-loss policy, the briefing also examines—in combination with limited changes in accession—brigade combat team cycle lengths and the number of units being rotated into theaters. In the summer and fall of 2008, early results were shared with OSD on a nearly continuous basis while the Secretary of Defense and the President of the United States reexamined the stop-loss policy. Their eventual decision to suspend stop-loss for the active Army by January 1, 2010, was consistent with the findings presented then and reported here. This documented briefing represents the reconfirmation of the findings in the early analysis, redone here with improved data and for the purpose of describing the issues, analytical model, findings, and lessons.

This research was sponsored by the Office of the Secretary of Defense and conducted within the Forces and Resources Policy Center of the RAND National Defense Research Institute, a federally funded research and development center sponsored by the Office of the Secretary of Defense, the Joint Staff, the Unified Combatant Commands, the Navy, the Marine Corps, the defense agencies, and the defense Intelligence Community.

For more information on the Forces and Resources Policy Center, see <http://www.rand.org/nsrd/ndri/centers/frp.html> or contact the director (contact information is provided on the web page).

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Summary

The U.S. Army balances a complex personnel system with formidable friction between its planned force structure and the realities of its accession, promotion, and separation processes. The Army has addressed these challenging supply-demand pressures with stop-loss and other personnel system adjustments, and its prediction of future demands does not appear to foretell relief from these pressures. The practice of stop-loss is a highly efficient means for meeting the needs of deployed units, but its benefits come at a price. This documented briefing explores these pressures as a backdrop to a broader analysis of stop-loss; in this manner, the stop-loss policy that the Army implemented in fiscal year (FY) 2002 and suspended in FY 2010 and a set of contenders can be examined against the myriad direct effects of service extensions. In estimating certain quantitative effects of stop-loss and a set of proposed alternatives, the study measured daily manpower flows. The detailed computer simulation model for this portion of the analysis was developed over several years with support from the Army. Important behavioral effects, such as those associated with units' personnel stability, may be cautiously inferred from the estimates, when appropriate. The study did not address political, social, and other exogenous factors associated with stop-loss policies.

In the end, this effort involved taking comparative measures of alternative policies relative to the Army's stop-loss policy, but such policies cannot be assumed to be independent of underlying system stresses. A decision to end stop-loss depends, in part, on how much more can be done within a system that has been managed into a workable state through formidable efforts by Army planners.

The challenge of ensuring the right numbers of soldiers of the right military occupational specialties (MOSs) and grades extends beyond theater. This challenge is rooted in, or can be exacerbated by, a fundamental clash between changing authorizations and the accession-promotion-separation process. Enlisting and developing soldiers to fit the requirements takes time. Even when enough soldiers are coming into the system to keep up the total end strength, maintaining the right composition in the right stages of development is difficult. The Army's Human Resources Command (HRC) has managed this balance, first at home and then, critically, in theater. This challenge has likely been a significant factor in past decisions about the use of stop-loss and thus figures prominently in this analysis.

Quantitatively, stop-loss is efficient for meeting the high-priority needs of deployed units. Because it keeps soldiers in their units, it generally fills deployment needs in the least amount of time possible and minimizes the budgetary impact of added recruitment, training, and personnel reassignment. Besides bolstering head counts with the soldiers who are generally best matched to their deployed jobs, the practice promotes unit personnel stability by helping to keep intact the units that have trained together for missions. It also keeps in check the

extended recruitment and reassignment activities needed to maintain a deployed force during periods of extraordinary demand.

But stop-loss policies exact a price on individual soldiers and their families. Involuntary extensions can create hardships and may also impose indirect costs in the form of psychological and social reactions among those who are stop-lossed, which could be detrimental to cohesion, morale, and other aspects of unit performance. Thus, the Army and the Office of the Secretary of Defense (OSD) sought viable alternatives to stop-loss. At the request of OSD, the RAND Corporation modeled and undertook a quantitative analysis of specific policy proposals. The study found that performance costs (especially in terms of unit fill levels in theater) vary by MOS and differ across policy alternatives. In a broader sense, these possible decrements in performance must be traded off against the possible intangible benefits of ending stop-loss—an endeavor that was beyond the scope of this work.

The alternatives proposed by OSD included the following:

- **Full stop-loss.** All soldiers assigned to a unit when it is ordered to deploy will deploy with it, and those whose estimated time of separation (ETS) is before the end of the tour, plus a 90-day period upon return, will be stop-lossed. It will take the form of an extension, resetting the soldier's ETS to 90 days after the return from deployment. This option matched the system status quo at the beginning of the study and the base cases against which the other options were compared.
- **Stop-loss if incentive is rejected.** A bonus incentive is offered to soldiers whose ETS conflicts with an impending deployment by the unit to which they are assigned. If accepted, the soldier's ETS is extended to 90 days after return from the deployment. If rejected, stop-loss is imposed and the ETS is reset in the same manner as in the full stop-loss scenario. This "take-it-or-leave-it" option uses the same soldiers in the same way, so deployed-unit fill performance is the same. The only difference is in the accounting for stop-lossed versus non-stop-lossed soldiers, along with the cost of providing the incentive program.
- **No stop-loss; deploy and replace.** All soldiers who are assigned to a unit when it is ordered to deploy will deploy with it, and those whose ETS comes before the end of the tour, plus a 90-day period upon return, will be separated according to the ETS and a replacement will be sought.
- **No stop-loss; conditional deployment with reenlistment bar.** All soldiers who are assigned to a unit when it is ordered to deploy will deploy with it if their ETS is beyond six months into the tour. Deployers whose ETS comes before the end of tour, plus a 90-day period upon return, will be separated according to the ETS and a replacement will be sought. Soldiers whose ETS comes before the six-month point in the tour will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way will be barred from reenlistment and must separate according to their ETS.
- **No stop-loss; conditional deployment.** All soldiers who are assigned to a unit when it is ordered to deploy will deploy if their ETS is beyond six months into the tour. Deployers whose ETS comes before the end of tour, plus a 90-day period upon return, will be separated according to the ETS and a replacement will be sought. Soldiers whose ETS comes before the six-month point of the tour will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way are eligible for reenlistment according to normal eligibility rules.

- **No stop-loss; avoid deployment.** All soldiers who are assigned to a unit when it is ordered to deploy but whose ETS comes before the end of tour, plus a 90-day period upon return, will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way are eligible for reenlistment according to normal eligibility rules.
- **No stop loss; incentivized to avoid replacement.** A bonus incentive is offered to soldiers whose ETS conflicts with an impending deployment by the unit to which they are assigned. If accepted, the soldier's ETS is extended to 90 days after return from the deployment. If rejected, the soldier will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way are eligible for reenlistment according to normal eligibility rules. Two variants of this option were studied: one with an acceptance rate of 25 percent and another with an acceptance rate of 50 percent (and a presumed larger, but unspecified, program price tag). The merits of spending for the incentive plan to avoid stop-loss were left to the sponsor to weigh, but the quantitative effects on unit performance—deployed-unit fill, personnel stability, and individual deployment tempo—were estimated to aid in identifying these trade-offs.

These options were tested by the RAND analysis, with the exception of the barring of reenlistments (due to subtleties of the model design). The analysis compared the options for two MOSs that have very different representations in the enlisted active force: 11B (infantryman) and 92Y (unit supply specialist). The same tests were also performed on the force as a whole, using a single composite, or mixed, MOS. The analysis relied on representative acceptance rates for the incentive offers (which could have been parameterized further, but this did not appear necessary to drive conclusions). For the option “stop-loss if incentive is rejected,” a high acceptance rate of 75 percent was used, as rejection meant a certain stop-loss for the soldier. For the lower-pressure incentives in the option “no stop loss; incentivized to avoid replacement,” acceptance rates of 25 percent and 50 percent were used. For each MOS, the tested force structure was composed of an authorized head count by enlisted grade range and type of unit. Soldiers were tracked individually throughout their careers using the five grade ranges E-1–E-2, E-3–E-4, E-5, E-6, and E-7–E-9. Authorizations were provided by the Army for the ranges E-3–E-4, E-5, E-6, and E-7–E-9, with soldiers from E-1–E-2 also contributing to the E-3–E-4 authorization group. Accession, promotion, and separation patterns for the simulation were based on Army personnel data, and raw recruits—as well as those with prior service—were used in the accession process. In addition to job type and grade requirements, the analysis considered a host of manning, deployment, stabilization, permanent-change-of-station, first-term, and retirement rules, as specified by the Office of the Deputy Chief of Staff of the Army for Personnel (G-1). Each of more than 200 simulations provided 20 simulated years' worth of day-by-day flow statistics involving many billions of individual decisions.

The effects of stop-loss cessation varied across the tested MOSs. Of the three MOS scenarios tested, 11B unit fill suffered the most when stop-loss was removed. At the levels of inflow and outflow from recent accession, promotion, and separation data, and with fiscal year 2011 projected force structure and rotational demands, 11B deployment fill rates suffered a 6.8-percent (absolute) decline—from 99.1 percent to 92.3 percent—with full simple cessation and avoidance of deployment (the option “no stop-loss, avoid deployment”). To focus on stop-loss changes, any simulation required a stabilized system in which required force structure was in balance with the processes of accession, promotion, and separation in as realistic a way as per-

mitted by the data. Our simulation used a steady-state base-case (stop-losses) system that was tuned to the required future force structure, but was built upon empirical and then-current personnel movement patterns, grade-wise assignment rules, and promotion times as faithfully as possible. The goal was to create a valid, robust, and detailed test bed that would respond to isolated policy changes for stop-loss in a manner fundamentally similar to any alternative system change that, too, would have to reconcile current personnel inventory, rules, and patterns with the new, anticipated force. As a control case, the model also tested a nonstabilized system using raw data for accessions, promotions, and separations, with no attempts to improve imbalances between authorizations and numbers available within grade. This “raw” system showed similar declines in deployed-unit fill when stop-loss was removed (6.7 percent), but the system had not been managed to reflect reasonable system fill performance to begin with (something that HRC would not have neglected in real life). The before-and-after results—however closely the deployed-unit fill drops matched those of the base case—were less comfortable to interpret as a serious representation of the real system. Stabilized, stop-losses base-case systems more reasonably conveyed the stresses and successful management of the real, functioning system and gave a more stable test bed for comparing the policy options. They also conservatively avoided understating the case for stop-loss, meaning that the real fill declines are likely to be closer to their higher values than those for the raw, nonstabilized boundary cases. It is important to note that the merits of the stop-loss options, relative to each other, showed little sensitivity to this issue and thus clear preferred choices emerged.

Apart from the stop-loss alternatives, certain operational changes can improve deployed-unit fill significantly. Reducing brigade combat team (BCT) cycle lengths and decreasing rotations where possible can have dramatic effects.¹

Deploying unconditionally and replacing separating soldiers in theater (“no stop-loss; deploy and replace”) fared little better than simple stop-loss removal, owing to the difficulty in finding appropriate replacements at the right time, with the system missing the soldiers who were not retained.

The deployed-unit fill rates for the 92Y MOS, which is amply supplied, were mostly unaffected by changes in stop-loss policy. It is intuitive that amply supplied MOSs do not need to rely on stop-loss. Tests on a mix of all MOSs showed similar small changes in deployed-unit fill. However, the mixed-MOS studies are presented here for general reference and edification of the option comparisons. Because skills are not necessarily substitutable in theater, the utility of mixed-MOS conclusions is limited to a comparison of the policy options and cannot be used to gauge the severity of actual fill changes.

Deployed-unit fill levels were best maintained for the option “stop-loss if incentive is rejected.” Indeed, because there is no choice to avoid deployment, exactly the same soldiers are retained as in the full stop-loss case; the only difference is that the status of some soldiers is altered at the cost of offering the take-it-or-leave-it reenlistment bonuses. But this option leaves stop-loss intact at a lowered level and therefore cannot offer the possible intangible benefits of reversing the policy, however one might evaluate them.

¹ The term *BCT cycle* refers to the Army’s adoption of a force generation plan that has each BCT repeat a cycle of training, being ready for deployment, deploying (or being available for deployment), and “resetting” from a deployment. The nominal cycle length used in this analysis was 36 months, but a reduced length was also tested. Reducing the cycle length makes a BCT available to deploy more frequently.

The most viable non-stop-loss options were the incentivized short reenlistments at either of their tested acceptance rates; the deployed-unit fill performance gaps were quantitatively modest and suggest a path out of the stop-loss imbroglio. For the more stringent 11B base case mentioned, the 6.8-percent simple cessation deployed-unit fill drop was reduced by half (to 3.55 percent) when 25 percent of eligible personnel accepted the reenlistment offer. Were a 50-percent acceptance level achieved (through more generous bonuses, for example), the fill drop was estimated to reduce by more than 76 percent—to just 1.6 percent.

The model included additional performance measures for each option. Personnel stability, as measured by the percentage of unit fill provided by the original supplying unit, dropped by as much as 17 percent with the option that sends all soldiers to theater without regard for their impeding separations.² The option “no stop-loss; conditional deployment” had a 12-percent drop. These drops were reduced to only 3.7 percent and 5.1 percent for the incentivized reenlistment options with 50- and 25-percent acceptance, respectively. In-theater retention, of course, mirrors these findings, with “no stop-loss; deploy and replace” and “no stop-loss; conditional deployment” being the natural worst performers with their in-theater replacements. The analysis considered measures of average deployed times and number of deployments per soldier, as well as home-station fill rates. The model also accounted for the number of soldiers who never deployed; as in the real-world system, this number was higher than expected (simulated at 30 percent for 11B with stop-loss and 37 percent without it, while the management of the real system brings this rate down to around 10 percent or less, still an unexpectedly high number). Tests of soldier histories and deployment assignment rules confirmed that this phenomenon was not a result of overlooked deployment opportunities or unreasonable use of stop-loss in times of intense demand.

The relative results were robust across test scenarios, but combining the projected Army force structure and its rotation plan with projected flow data indicated that the system would remain stressed to meet grade-wise demands. This finding cautions against considering only options that do not replace stop-loss with some alternative separation delay. Accession increases, shortened BCT cycles, decreased rotations, and out-of-grade assignments were tested for their ability to help the Army recover from deployed-unit fill drops. Accession increases were shown to be somewhat effective but can involve delayed benefits (e.g., in-theater improvements initially lag accession increases); the model employed these increases to represent already-planned growth to a 547,000-strong active-duty system rather than a serious remedy to stop-loss. Shortening the BCT cycles was much better at improving deployed-unit fill rates. Reducing the cycles from 36 months to 24 months chopped the simple cessation 6.8-percent fill drop to around 4.9 percent. A 24-month cycle time represents a dramatic reduction, but interpolation allowed the model to predict other changes. The Army has already decreased cycle times less dramatically, so the beginning 6.8-percent drop is, again, something of an overestimate that gives stop-loss the benefit of the doubt throughout the analysis (and strengthens the arguments suggesting that it can be ceased). Finally, if the number of rotations could be decreased, deployed-unit fill would improve significantly. Having one fewer deployed heavy BCT and one fewer deployed infantry BCT would reduce the 6.8-percent fill drop from stop-loss cessation to under 2.5 percent.

² Stop-losses soldiers were assumed to deploy with their unit. Note that personnel stability is a strictly quantitative measure here and is meant to reflect the extent to which soldiers who train together prior to deployment remain together in theater. In other words, the model did not consider other qualitative benefits of unity among soldiers and their command.

The quantitative estimates presented here characterize the benefits being obtained from stop-loss and point to favorable options to help minimize the impacts and risks of ceasing it. Some of these alternatives, such as cycle length and rotation changes, involve much operational and logistical consideration, requiring a different set of studies. Seeing their mitigating effects in this context, however, is instructive and perhaps offers hope for staving off future need for stop-loss. A more concrete finding is that among DoD's primary set of proposed stop-loss policy alternatives, those that replace stop-loss with incentivized reenlistments provide favorable system performance measures. These options have their own associated costs, including bonus payments and their administration, which are not considered here but can easily be applied to the numbers of voluntary contract extensions for cost studies. Assuming that these incentive payments affect reenlistment rates positively, they can be a suitable cost for maintaining the effectiveness of the deployed force and for securing soldiers and missions. The derived benefits—or even simpler outcomes, such as improved fill rates—are not fully quantifiable. Moreover, many intangible benefits of ceasing stop-loss are hard if not impossible to quantify, yet policymakers must weigh them against the specific performance sacrifices estimated here.

DoD's stated desire from the outset of this research was to cease stop-loss if deleterious quantitative effects of the type investigated here could be comfortably ruled out. With the modest performance sacrifices required under the incentivized reenlistment plans studied, it is recommended that such a plan be implemented and that stop-loss be shelved.

Acknowledgments

This research was performed at a time of great demand and challenge for the U.S. Department of Defense and, specifically, the U.S. Army. The expert knowledge and data generously shared by members of the military personnel community during this period were invaluable. Their contributions have been handled with greatest care and objectivity in this analysis. At their request, early results were shared with OSD staff on a nearly continuous basis to help inform stop-loss policy decisions then being considered by the Secretary of Defense and the President of the United States. An earlier draft of this work, based on quickly gathered, tentative data, was delivered to the sponsor; this documented briefing represents the reconfirmation of findings with improved data and aid from the individuals listed here. COL Debbra Head, LTC Keith Olson, LTC Lynette Arnhart, and MAJ Marie Hall were all very helpful. Deep gratitude is also extended to LTC Robin Parsons and Bradford Loo, both in OSD, and, at RAND, Laurie McDonald and James Hosek, director of the Forces and Resources Policy Center at the time of this research. Peer reviewers W. Michael Hix and Ronald Sorter did a critical and much-appreciated job in improving the presentation of the results. Finally, personal thanks are extended to David S. C. Chu, who was the Under Secretary of Defense for Personnel and Readiness when this work began.

Abbreviations

ARFORGEN	Army Force Generation
BCT	brigade combat team
CONUS	continental United States
CTC	combat training center
ETS	estimated time of separation
FY	fiscal year
G-1	Office of the Deputy Chief of Staff of the Army for Personnel
HRC	U.S. Army Human Resources Command
LM	life-cycle manning
MOS	military occupational specialty
OCONUS	outside the continental United States
OSD	Office of the Secretary of Defense
PCS	permanent change of station
TDA	table of distribution and allowances

Introduction



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Assessing Stop-Loss Policy Options Through Personnel Flow Modeling

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1

This documented briefing examines alternatives to stop-loss. The study was sponsored by the Office of the Secretary of Defense (OSD) and conducted within the Forces and Resources Policy Center of the RAND National Defense Research Institute. The initial research was done in 2008 under a highly demanding schedule driven by policy issues that were paramount at that time. This final version of the research had the benefit of improved data and was completed to describe and document the research in view of its likely value if and when stop-loss or similar personnel policies are considered in the future.

Project Goal

- **Develop and apply decision support tools to help assess the impacts of alternative stop-loss policies on unit conditions and individual career experiences in the active enlisted Army.**

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2

The goal of the project was to develop and apply powerful quantitative decisionmaking tools to assess specific stop-loss proposals by OSD. The focus was on the proposals' quantitative effects on deployed-unit fill, personnel stability, and the individual deployment experiences of soldiers in the active enlisted force.

This quantitative modeling of policy options underpinned the larger policy analyses being performed by OSD and the Army. The policy options were identified and debated well in advance, but their likely effects on the soldier ranks were not well understood. OSD had a preferred course of action, but it wanted to know whether the effects would be too severe to allow this choice. The RAND Corporation was asked by OSD to perform the research documented here with an immediate start in February 2008 and at a very fast pace. RAND's role was not to examine or elaborate on the stop-loss literature, to study the financial costs or administrative procedures for implementing each alternative, or to give final recommendations to OSD beyond the input described here. However, this document offers a brief synopsis of stop-loss for readers who may be less familiar with the topic.

Qualitative Summary

- **The Army has addressed challenging supply-demand pressures with stop-loss and other personnel system adjustments; its prediction of future demand does not appear to alleviate these pressures.**
- **The problem of having the right number of soldiers in the right MOS and grade extends beyond theater; caused or exacerbated by a fundamental clash between expected authorizations and accession/promotion process. HRC is pressed into managing this problem first at home and then, critically, in theater. Will be shown to affect stop-loss cessation decision.**
- **Quantitatively, stop-loss is efficient for easing high-priority need.**
- **Alternatives to stop-loss exist, at comparative predicted “costs” presented here. These vary by MOS and must be traded off against the intangible benefits of stop-loss cessation.**

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3

The original study results were tentative in nature and shared with the sponsor as they were obtained. The results presented here reflect revisions based on improved data, but they confirm the earlier conclusions. This documented briefing preserves the information in essentially the same form in which it was shared with the sponsor, with some changes to provide additional information about the study's objectives and a more thorough review of the set of alternatives under consideration. This chapter provides an overview of the study and results, as well as background on the alternatives that were under consideration at the time of this research. The remainder of the document includes additional analytical support for the results and offers a more detailed discussion of the points that played a role in the major policy decisions to re-examine stop-loss and, ultimately, to suspend it.

The bulleted points in the slide above are the results of testing; these points are not merely general pre-study observations. The earliest results confirmed that the Army balances a complex personnel system that has formidable friction between planned force structure and the realities of accession, promotion, and separation. The Army has addressed these challenging supply-demand pressures with stop-loss and other personnel system adjustments, which proved their worthiness in the tests. The Army's prediction of future demand does not appear to foretell relief from these pressures.

The problem of having the right numbers of soldiers of the right military occupational specialties (MOSs) and grades extends throughout the system, not just theater. This challenge is rooted in, or can be exacerbated by, a fundamental clash between dynamically changing authorization levels and the accession-promotion-separation process. Enlisting and developing soldiers to fit changing requirements takes time. Even when enough soldiers are entering the system to keep up the Army's total end strength, maintaining the right composition in the right stages of development, over years, is difficult. The Army's Human Resources Command (HRC) has managed this balance, first at home and then, critically, in theater. This challenge

became a prominent part of the analysis presented here and has likely influenced past decisions on the use of stop-loss.

Despite reasoned arguments against it, stop-loss is, from a quantitative viewpoint, efficient for meeting the high-priority needs of deployed units. Because it keeps soldiers in their units, it generally fills deployment needs in the least amount of time possible and minimizes the budgetary impact of added recruitment, training, and personnel reassignment. Besides bolstering head counts with the soldiers who are generally best matched to their deployed jobs, the practice promotes unit personnel stability by helping to keep intact the units that have trained together for their missions. It also keeps in check the extended recruitment and reassignment activities needed to maintain a deployed force during periods of extraordinary demand.

The quantitative estimates, discussed later, characterize the benefits of stop-loss and point to favorable options to help minimize the impact and risks of ceasing it. Some of these alternatives, such as cycle length and rotation changes, involve much operational and logistical consideration, requiring a different set of studies. Seeing their mitigating effects in this context, however, is instructive and perhaps offers hope for staving off future need for stop-loss. A more concrete finding is that among DoD's primary set of proposed stop-loss policy alternatives, those that replace stop-loss with incentivized reenlistments provide favorable system performance measures. These options have their own associated costs, including bonus payments and their administration; the exact bonuses are not specified here, but, when their amounts are determined, they can be easily applied to the numbers of voluntary contract extensions to obtain estimates for cost studies. Assuming that these incentive payments affect reenlistment rates positively, they can be a suitable cost for maintaining the effectiveness of the deployed force and for securing soldiers and missions. The derived benefits of these alternatives—or even simpler outcomes, such as improved fill rates—are not fully quantifiable. Moreover, many intangible benefits of ceasing stop-loss are not quantifiable and must be weighed against the specific performance sacrifices estimated here.

DoD's stated desire from the outset of this research was to cease stop-loss if deleterious quantitative effects of the type investigated here could be comfortably ruled out. With the modest performance sacrifices required under the incentivized reenlistment plans studied, it is recommended that such a plan be implemented and that stop-loss be shelved.

Option Code	Stop-Loss Policy Alternatives
10	• Full stop-loss: Deploy unconditionally; apply stop-loss in theater.
9	• Stop-loss if incentive rejected: Offer monetary incentive to voluntarily extend for full deployment. If not accepted, extend using stop-loss.
7	• No stop-loss; deploy and replace: Deploy unconditionally; use individual replacement in theater. • No stop-loss; conditional deployment: Do not involuntarily extend; deploy based on time of ETS within deployment period according to these rules:
6	– For ETS beyond first 6 months, deploy, then replace in theater. For ETS within first 6 months, do not deploy; replace prior to deployment and bar reenlistment.
5	– For ETS beyond first 6 months, deploy, then replace in theater. For ETS within first 6 months, do not deploy; replace prior to deployment.
1	• No stop-loss; avoid deployment: Do not involuntarily extend or deploy soldier; replace prior to affected deployment.
0	• No stop loss; incentivize to avoid replacement: Offer monetary incentive to voluntarily extend for full deployment. If not accepted, do not extend or deploy—replace prior to affected deployment.
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OSD identified several candidate alternatives for addressing the needs leading to stop-loss. They are presented in this slide, beginning with the option that places the greatest demand on the affected soldier (full stop-loss). The index numbers shown are included to represent the options succinctly throughout the briefing. The numbering scheme was intended to provide ready recognition of the severity of stop-loss imposition, ranging from 10 for full use of stop-loss down to 1 for no stop-loss. A zero category was added to represent an even more lenient choice of providing incentives to encourage voluntary reenlistment, even with stop-loss ceased. Variations of “0” policies are used later to distinguish among relative sizes of incentives. Although there are ten degrees of severity but fewer proposed choices, the framework allows continuity if more options are considered in future studies and was effective in discussions of the options with the sponsor.

The options provided by OSD were as follows:

10. **Full stop-loss.** All soldiers assigned to a unit when it is ordered to deploy will deploy with it, and those whose estimated time of separation (ETS) is before the end of the tour, plus a 90-day period upon return, will be stop-lossed. It will take the form of an extension, resetting the soldier’s ETS to 90 days after the return from deployment. This option matched the system status quo at the beginning of the study and the base cases against which the other options were compared.
9. **Stop-loss if incentive is rejected.** A bonus incentive is offered to soldiers whose ETS conflicts with an impending deployment by the unit to which they are assigned. If accepted, the soldier’s ETS is extended to 90 days after return from the deployment. If rejected, stop-loss is imposed and the ETS is reset in the same manner as in the full stop-loss scenario. This “take-it-or-leave-it” option uses the same soldiers in the same way, so deployed-unit fill is the same. The only difference is in the accounting for stop-

lossed versus non-stop-lossed soldiers, along with the cost of providing the incentive program.

7. **No stop-loss; deploy and replace.** All soldiers assigned to a unit when it is ordered to deploy will deploy with it, and those whose ETS comes before the end of the tour, plus a 90-day period upon return, will be separated according to the ETS and a replacement will be sought.
6. **No stop-loss; conditional deployment with reenlistment bar.** All soldiers who are assigned to a unit when it is ordered to deploy will deploy with it if their ETS is beyond six months into the tour. Deployers whose ETS comes before the end of tour, plus a 90-day period upon return, will be separated according to the ETS and a replacement will be sought. Soldiers whose ETS comes before the six-month point in the tour will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way will be barred from reenlistment and must separate according to their ETS. This reenlistment bar distinguishes Option 6 from Option 5, but the model's reenlistment mechanism does not provide a valid path for predicting and evaluating the effects of such reenlistment restrictions, so this option was not studied.
5. **No stop-loss; conditional deployment.** All soldiers who are assigned to a unit when it is ordered to deploy will deploy if their ETS is beyond six months into the tour. Deployers whose ETS comes before the end of tour, plus a 90-day period upon return, will be separated according to the ETS and a replacement will be sought. Soldiers whose ETS comes before the six-month point of the tour will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way are eligible for reenlistment according to normal eligibility rules.
1. **No stop-loss; avoid deployment.** All soldiers who are assigned to a unit when it is ordered to deploy but whose ETS comes before the end of tour, plus a 90-day period upon return, will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way are eligible for reenlistment according to normal eligibility rules.
0. **No stop loss; incentivized to avoid replacement.** A bonus incentive is offered to soldiers whose ETS conflicts with an impending deployment by the unit to which they are assigned. If accepted, the soldier's ETS is extended to 90 days after return from the deployment. If rejected, the soldier will not deploy and a replacement will be sought prior to preparation for unit deployment. Soldiers who avoid deployment in this way are eligible for reenlistment according to normal eligibility rules. Two variants of Option 0 were studied: one with an acceptance rate of 25 percent and the other with an acceptance rate of 50 percent (and a presumed larger, but unspecified, program price tag). The merits of spending for the incentive plan to avoid stop-loss were left to the sponsor to weigh, but the quantitative effects on unit performance—deployed-unit fill, personnel stability, and individual deployment tempo—were estimated to aid in identifying these trade-offs.

Summary Particulars

- **Effects of stop-loss cessation vary across tested MOSs:**
 - 11B deployment fill rate suffers up to 6.8% with full cessation.
 - 92Y is mostly unaffected at reported inflow-outflow.
 - Mix of all MOSs shows similar small change.
- **Performance is maintained if stop-loss is forced when soldier rejects short reenlistment, but this option leaves stop-loss intact at a lowered level.**
- **The most viable non-stop-loss options are incentivized short reenlistments; recovery gap is quantitatively modest, reducing performance losses by nearly half (down to only 3.55% fill loss) with moderate bonus acceptance rates.**
- **Relative results are robust across test scenarios, but combining Army force and rotation plan with projected flow data indicates that the system will remain stressed to meet grade-wise demands. This cautions against options that go beyond replacing stop-loss with a direct alternative separation delay. Accession increases, shortened BCT cycles, and out-of-grade assignments are effective but already heavily employed.**

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The effects of stop-loss cessation varied across the tested MOSs: 11B (infantryman), 92Y (unit supply specialist), and a single composite, or mixed, MOS. Of the three MOS scenarios tested, 11B (infantryman) deployed-unit fill rates suffered the most without stop-loss. At the levels of inflow and outflow from recent accession, promotion, and separation data, and with fiscal year (FY) 2011 projected force structure and rotational demands, 11B deployment fill rates suffered a 6.8-percent (absolute) decline—from 99.1 percent to 92.3 percent—with the full, simple cessation of stop-loss. The analysis used a steady-state base-case (stop-losses) system that arguably gives conservative support for the importance of stop-loss.

The fill performance of the 92Y MOS (unit supply specialist), which is amply supplied, was mostly unaffected by changes in stop-loss policy. It is intuitive that amply supplied MOSs do not need stop-loss. Tests on a mix of all MOSs showed similar small changes in performance. However, the results of the mixed-MOS studies are included for general reference and edification of the option comparisons. There is often interest in performance measure changes for a “typical” soldier, without regard for MOS. However, it is important to note that the lack of substitutability of skills in theater limit the mixed-MOS conclusions: There simply is no “typical” soldier when it comes to a deployment need. Only comparisons between the options for this case should be considered at all, and any absolute change in the severity of actual performance measures should be eyed cautiously.

Among the changes to stop-loss policy, deployed-unit fill levels were best preserved under Option 9, “stop-loss if incentive is rejected.” Indeed, as there is no real choice to avoid deployment in this scenario, exactly the same soldiers are retained as in the full stop-loss case (Option 10); the only difference is that the status of some soldiers is altered at the cost of offering the take-it-or-leave-it reenlistment bonuses. But this option leaves stop-loss intact at a lowered level and therefore cannot offer the possible intangible benefits of reversing the policy, however one might evaluate them.

The most viable non-stop-loss options were incentivized short reenlistments at either of their tested acceptance rates; the deployed-unit fill performance gaps were quantitatively modest and suggest a path out of the stop-loss imbroglio. For the more stringent 11B base case mentioned earlier, the simple cessation 6.8-percent drop was reduced by nearly half (to 3.55 percent) when 25 percent accepted the reenlistment offer. Were a 50-percent acceptance achieved (through more generous bonuses, for example), the performance drop was estimated to reduce by more than 76 percent—to just 1.6 percent.

The model included additional performance measures for each option, as discussed later in this briefing.

The relative results were robust across test scenarios, but combining the projected Army force structure and its rotation plan with projected flow data indicates that the system would remain stressed to meet grade-wise demands. This finding cautions against considering only options that do not replace stop-loss with some alternative separation delay. Accession increases, shortened brigade combat team (BCT) cycles,¹ and out-of-grade assignments were tested for their ability to help the Army recover from performance drops. Accession increases were shown to be somewhat effective but can involve delayed benefits (e.g., in-theater improvements lag accession increases); the model employed these increases to represent already-planned growth to a 547,000-strong active-duty system rather than a serious remedy to stop-loss. Shortening the BCT cycles was much better at improving deployed-unit fill performance. Reducing the cycles from 36 months to 24 months chopped the simple cessation 6.8-percent fill drop to around 4.9 percent. A 24-month cycle time is a dramatic reduction, but interpolation allowed the model to predict other changes. The Army has already decreased cycle times less dramatically, so the beginning 6.8-percent performance drop is, again, something of an overestimate that gives stop-loss the benefit of the doubt throughout the analysis (and strengthens the arguments suggesting that it can be ceased). Finally, if the number of rotations could be decreased, performance would improve significantly. Having one fewer deployed heavy BCT and one fewer deployed infantry BCT would reduce the 6.8-percent performance drop from stop-less cessation to under 2.5 percent.

¹ The term *BCT cycle* refers to the Army's adoption of a unit-stabilizing force generation process (Army Force Generation, or ARFORGEN) in which each BCT repeats a cycle of training, being ready for deployment, deploying (or being available for deployment), and "resetting" from a deployment. The method of populating units has also been called *life-cycle manning* (LM). Noncycled units are also included in the Army system (and in the model); these units are filled using the individual replacement system, in which soldiers are moved whenever appropriate to suit unit needs, individual qualifications and availability, and various rules for personnel assignment. The nominal BCT cycle length considered in this study was 36 months, but the model also considered 24-month cycles. Reducing the life-cycle length makes a BCT available to deploy more frequently. If deployment tour lengths are unchanged, BCTs, on average, spend more time deployed—and theater fill rates increase—but the downside is an increased deployment pace and its effects on the active force, as well as an increased demand for training, repair or restoration of equipment, and other needs.

Stop-Loss and Proposed Alternatives

Objectives of This Briefing

- ➔ • **Discuss stop-loss and present a range of stop-loss policy alternatives.**
- **Outline a quantitative modeling approach for predicting policy effects on personnel flow and unit condition.**
- **Present key observations of performance from setup and simulation of base-case systems with stop-loss.**
- **Present effects of alternative stop-loss policies on system performance.**
- **Discuss “costs” of recovering system performance under alternative stop-loss choices.**

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This chapter briefly reviews stop-loss and presents the set of proposed alternatives to its current use described in Chapter One. Chapter Three discusses the quantitative tools used in the analysis. The quantitative results were twofold. First there were the findings from the effort to set up the base-case systems representing the full stop-loss option. Although this aspect of the study may seem to depart from the stop-loss question, it was a necessary step in preparing the analysis, and the findings provide insights into the stresses that can lead to stop-loss and make it difficult to cease. These findings are presented in Chapter Four. The second set of quantitative results comprised the head-to-head comparisons of each stop-loss policy alternative with the base case in each of the MOS-driven scenarios. These findings are presented in Chapter Five.

Chapter Six discusses the results from the tests of practices beyond the primary options, and Chapter Seven presents the study's conclusions and a synopsis of the merits of the choices for continuing or ending stop-loss.

Characteristics of Stop-Loss

- **The legal, involuntary extension of active duty service to retain soldiers beyond ETS date**
- **Created by U.S. Congress after Vietnam War; employed in Persian Gulf War, Somalia, Haiti, Bosnia, Kosovo, and the current war on terrorism**
- **Pits improved fill and enhanced cohesiveness of deployed units against undesired effects on soldiers and families**
- **Has affected over 58,000 soldiers from 2002 through April 2008**
- **Keenly targeted for reduction to minimal usage by Secretary of Defense Robert Gates at the time of this research**
- **Has been addressed by the Army through short- and long-term plans for reduction using incentives for voluntary extension and transition to life-cycle management of units**
- **Enjoyed a reduction by mid-2007 but increased significantly during subsequent escalation in deployment of U.S. forces**

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This slide lists the principal features of stop-loss, along with the efforts by OSD and the Army to address its use.

The practice of stop-loss retains soldiers who are scheduled to end their voluntary terms of service during an impending or ongoing deployment. These involuntary extensions are legal and have been employed extensively by the Army over the past two decades. They provide a highly efficient means for meeting the high-priority needs of deployed units. Because stop-loss keeps soldiers in their units, it generally fills deployment needs in the least amount of time possible and minimizes budgetary impact of added recruitment, training, and personnel reassignment. Besides bolstering head counts with the soldiers who are generally best matched to their deployed jobs, the practice promotes unit personnel stability by helping to keep intact the units that have trained together for missions. It also keeps in check the extended recruitment and reassignment activities needed to maintain a deployed force during periods of extraordinary demand.

Although the prospect of being extended is a long-standing component of soldiers' voluntary service, the uncertainties and hardships it can place on individuals and families are as problematic for the Army as for affected troops. The Army has made serious efforts to address its causes and need in the past without being able to fully suspend its use.

Option Code	<i>Stop-Loss Policy Alternatives</i>
10	• Full stop-loss: Deploy unconditionally; apply stop-loss in theater.
9	• Stop-loss if incentive rejected: Offer monetary incentive to voluntarily extend for full deployment. If not accepted, extend using stop-loss.
7	• No stop-loss; deploy and replace: Deploy unconditionally; use individual replacement in theater.
	• No stop-loss; conditional deployment: Do not involuntarily extend; deploy based on time of ETS within deployment period according to these rules:
6	– For ETS beyond first 6 months, deploy, then replace in theater. For ETS within first 6 months, do not deploy; replace prior to deployment and bar reenlistment.
5	– For ETS beyond first 6 months, deploy, then replace in theater. For ETS within first 6 months, do not deploy; replace prior to deployment.
1	• No stop-loss; avoid deployment: Do not involuntarily extend or deploy soldier; replace prior to affected deployment.
0	• No stop loss; incentivize to avoid replacement: Offer monetary incentive to voluntarily extend for full deployment. If not accepted, do not extend or deploy—replace prior to affected deployment.
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OSD identified several candidate alternatives for addressing the needs leading to stop-loss. The alternatives were described in detail in Chapter One, but this slide is presented here for completeness and continuity. As explained earlier, the index numbers are included to represent the options succinctly throughout this briefing.

Flow Modeling to Predict Policy Effects

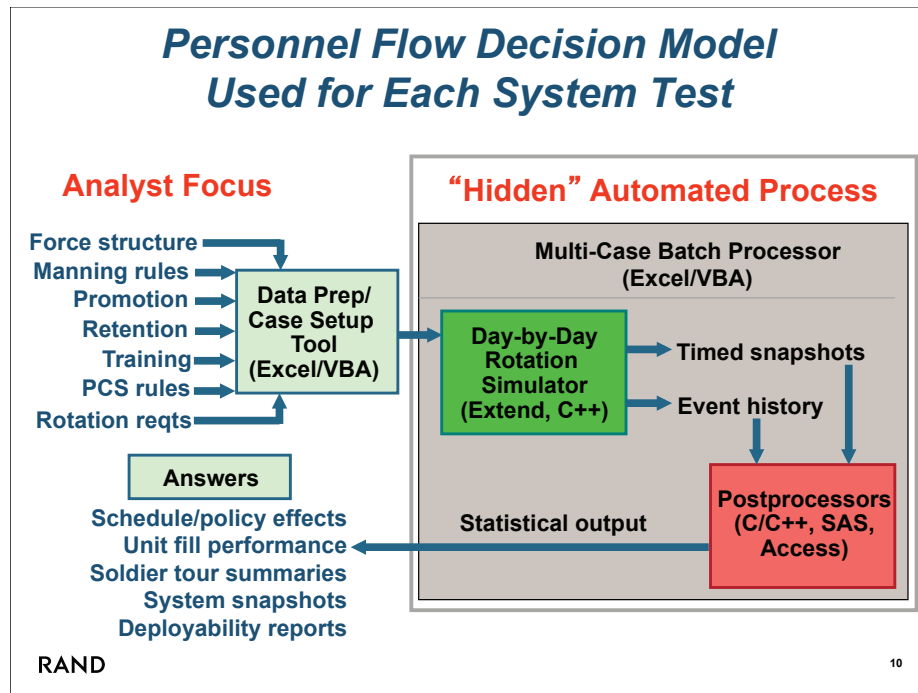
Objectives of This Briefing

- Discuss stop-loss and present a range of stop-loss policy alternatives.
- ➔ • Outline a quantitative modeling approach for predicting policy effects on personnel flow and unit condition.
- Present key observations of performance from setup and simulation of base-case systems with stop-loss.
- Present effects of alternative stop-loss policies on system performance.
- Discuss “costs” of recovering system performance under alternative stop-loss choices.

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This chapter outlines the overall modeling approach to the analysis of the stop-loss policy alternatives.



The model developed for this study is complex and cannot be described in detail in this briefing. The appendix provides an introduction to the modeling methodology, which substantially extends an approach used in several earlier Army manpower studies conducted at RAND. This chapter includes a brief overview of how the modeling approach to address the stop-loss question led to the findings presented here.

The salient feature of this slide is that a model-based decision system is available to the analyst as a “black box” that captures extensive user descriptions of the personnel system structure and policies and produces an extensive list of outputs to describe the expected responses of the personnel system. Each case involved preparing more than 100 worksheets of input data and feeding dozens of files into the simulator, which contained tens of thousands of specialized code statements; postprocessing involved several specially designed programs and many dozens of database queries of the simulator outputs. The design and testing of the base cases and the experiments on the options involved more than 1,000 case preparations and runs.

The inputs to the model can be tailored to address numerous policy questions, and the simulator at the heart of the system is designed to conform its representation of the personnel system accordingly. The worksheet-based input “front end” controls the simulator (including the stop-loss options) and configures the manpower system—its planned force structure and size; seasonally sensitive accession patterns; promotion and separation behaviors; personnel rules for training times, permanent changes of station (PCSs), and deployment decisions; and Army deployment rotational requirements. These data came from Army-supplied personnel databases, deployment schedules, HRC rules, and stop-loss protocols, in addition to the stop-loss variations proposed by OSD and enumerated earlier.

Day-by-Day Rotation Simulator

- **Accesses soldiers and decides/tracks personnel assignments, promotions, deployments, separations**
- **Observes personnel rules for first-termers, retirements, CONUS vs. OCONUS tours, travel, stabilization periods, and movement fences**
- **Replaces soldiers in units by looking system-wide at MOS, grade, and PCS eligibility**
- **Configures units using authorizations, manning rules, and deployment and combat training center priorities and demands**
- **Provides comprehension outputs for immediate results and enhanced postprocessing**

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Central to the model is a large-scale discrete-event simulator that follows the careers of individual simulated soldiers, from accession through basic training, initial assignment, successive station changes, deployments, promotions, and, finally, separation. It observes the rules for assignments during the soldier's first term, prior to retirement, and following returns from deployments. The simulator looks across the entire Army for appropriate and available replacements when a soldier prepares to vacate a station, and it carefully adheres to varying manning rules for units (ARFORGEN cycles versus individual replacement for some units). Order stabilization periods are included for soldiers when they are ordered to their next stations, and the simulator accounts for travel times between assignments. It also includes minimum required times on station prior to deployment or PCS and specified training periods for deploying units. A log of all relevant decisions regarding each soldier's assignments is maintained for postprocessing and performance measurement. Snapshots of system conditions are used to identify unit conditions, including the deployability status of individual soldiers in each unit, their PCS availability (if required), and the extent to which each rotational demand is being satisfied by assigned units. Decisions regarding the needs of the system, unit, and individual soldier are made multiple times per day; each simulation run accounted for 20 years of such days to achieve and measure the steady-state performance of each proposed scenario.

The simulator postprocesses the logs, and results can be presented in a variety of ways. For this study, the many individual assignments and movements (recorded in a compacted file of a gigabyte or more per case) were retrieved through a series of Microsoft Access® queries, and the results were then summarized and depicted graphically using Microsoft Excel®. Other summaries were obtained using specialized code developed in C++ for processing the simulation event history. Examples include the probability distributions of unit on-hand levels, deployment tempos for individuals, and other career characteristics.

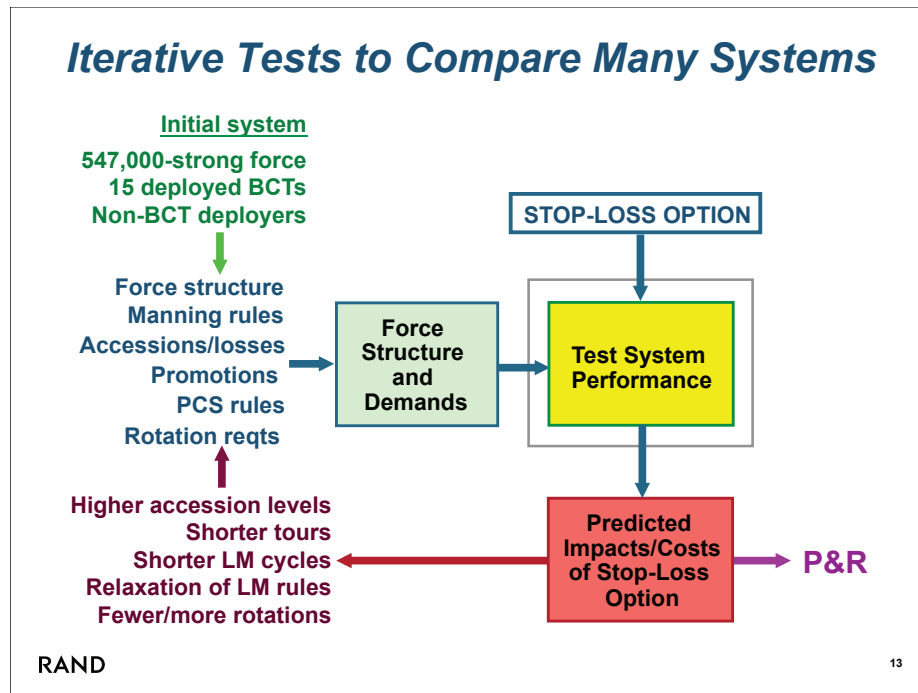
Model Behavior and Choices for Each System

- PCS, deployment, and other movement decisions are simulated for *each* enlisted soldier *daily* over a long (e.g., 20-year) recording period. Includes many billions of individual decision actions.
- Simulator records conditions for both units and individuals.
- Force end strengths can be varied—system-wide and by unit.
- Studies are performed at the MOS level, by grade range (e.g., E-1–E-2, E-3–E-4, E-5, E-6, and E-7–E-9). Composite MOS groups can be used.
- Units can be set to operate under life-cycle manning (LM) or individual replacement system rules; test systems composed of both types.
- Individual personnel policies (tour lengths, stabilization, PCS restrictions, etc.) can vary by unit type, deployment, and MOS.
- Enlisted soldier accession, promotion, and separation behaviors can be varied—including incorporation of seasonal effects.
- Stop-loss policy can be varied, per rotation.

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Each test gathered any desired number of simulated years' worth of day-by-day flow statistics (in this case, 20 years' worth), involving many billions of decision actions relating to individual soldiers. The model then observes and records conditions for both units and soldiers and compares the stop-loss options for individual MOSs. (Tests may also be performed on the force as a whole or using other composites, or mixes, of MOSs.) For each MOS, the tested force structure is composed of an authorized head count by enlisted grade range and type of unit. Soldiers were tracked individually throughout their careers using the five grade ranges E-1–E-2, E-3–E-4, E-5, E-6, and E-7–E-9. Authorizations were provided by the Army for ranges E-3–E-4, E-5, E-6, and E-7–E-9, with soldiers from E-1–E-2 also contributing to the E-3–E-4 authorization group. Accession, promotion, and separation patterns for the simulation were based on Army personnel data, and both raw recruits and those with prior service were used in the accession process. In addition to job type and grade requirements, the soldiers in the model adhere to a host of manning, deployment, stabilization, PCS, first-term, and retirement rules, as specified by the Office of the Deputy Chief of Staff of the Army for Personnel (G-1) and verified by Army planners at the beginning of the study. These rules did not vary between the base-case and alternative-policy runs. Stop-loss rules were altered at run time to test the explicit policy options being considered, however.



A model like the one used for this study is important, but so is the manner in which it is employed. This slide shows the iterative process for preparing a case (i.e., a specific stop-loss alternative), testing it for comparative performance measures, and repeating the process with various modifications to the system that might counter drops in system performance. In the final step in the process shown here, the results are provided to the Office of the Under Secretary of Defense for Personnel and Readiness (P&R in the slide). These steps, along with the performance of each stop-loss alternative, are illustrated in the following slides.

Comparative Predictors Sought

- **Number of stop-losses incurred**
- **Number of in-theater replacements required**
- **Unit fill rates in theater**
- **Cohesiveness—including percentage of unit not backfilled for deployment**
- **Fill rates for units at home—especially those providing replacements**
- **Differences across MOSs and grades**
- **Incentive program effectiveness and costs**
- **Average number and length of deployments per soldier**

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The model takes into account explicit measures for comparing stop-loss alternatives, including the following:

- number of stop-losses incurred
- number of in-theater replacements required
- unit fill rates in theater
- unit personnel stability, such as the percentage of the unit not backfilled for deployments
- fill rates for units at home, especially those providing replacements
- differences across MOSs and grades
- incentive program effectiveness and costs
- average number and length of deployments per soldier.

Performance of Base-Case Systems with Stop-Loss

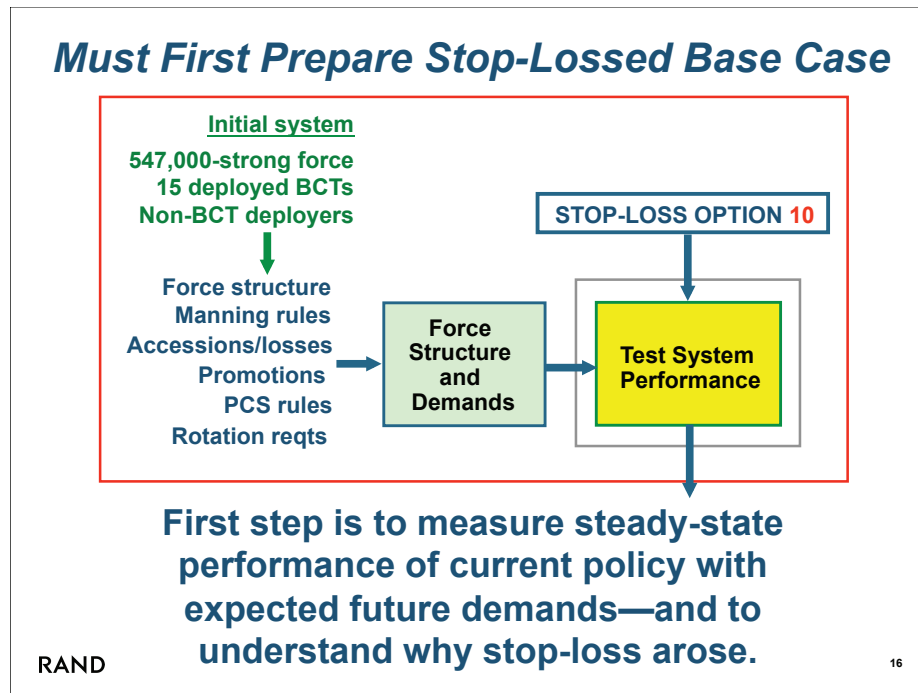
Objectives of This Briefing

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- Present effects of alternative stop-loss policies on system performance.
- Discuss “costs” of recovering system performance under alternative stop-loss choices.

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This chapter presents the findings made when working to set up the base-case systems for the full stop-loss option.



This step is actually part of the iterative process described in Chapter Three, with the results and feedback loop obscured. In this example, Option 10 is the stop-loss specification. Being the full stop-loss case, it is special in that it sets the bar for the remaining policy alternatives. As noted, this setup is used to gauge the system conditions that precipitated the adoption of stop-loss and that can affect decisions regarding its replacement.

Notes About Base Cases

- **Base cases (for each MOS scenario):**
 - **Are intended to mimic real world using Army's inputs, demands, and personnel rules.**
 - **Will give insights into types of problems leading to stop-loss and predict barriers to changing it.**
 - **May perform better or worse than the real system, but**
 - **Can be set and then allowed to change specifically depending on stop-loss policy.**

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A base case for an MOS test uses the Army's real data and personnel rules as faithfully and validly as the model allows. The base cases used here employ stop-loss and have undergone realistic adjustments to create stable systems for which changes in stop-loss policy can be highlighted. Because it uses the full stop-loss policy, a base case can provide insights into the system stresses that lead to stop-loss and predict difficulties that could result from abruptly dropping it. Although a base-case simulation may perform differently in some ways from the real world, it seeks to represent a viable, functioning system under the stop-loss policy, and this system can be used as a test bed for changes restricted just to stop-loss itself. For instance, it can be used to measure drops in fill performance from replacing stop-loss.

What Does a Stabilized Base-Case System Offer?

- Provides system in a “healthy” overall state.
- Destabilizing modifications cannot persist for long without detection; have implications for policy design.
- Allows detection of attributable performance changes when varying stop-loss policy.
- Forces a working system relying on input data from static “snapshots” with change direction unknown. They need modification, as is done via real management.
- Allows testing policies with rules stringently applied. Simulated rules are many and robust, but it is possible to restrict exceptions that cloud policy effects.

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A stable base case was developed for each MOS studied. The remainder of this chapter describes that process. Essentially, it involves adjusting model parameters for accessions, separations, and assignments so that the system maintains consistent end-strength levels that are matched to the authorizations for cycled units, grade-wise and overall.

A base-case system that has been stabilized would continue operating in a steady state if left undisturbed. However, the world is dynamic, and keeping the Army in one configuration is not realistic. With this acknowledgement, for testing purposes, a functioning, “healthy,” and stabilized system is indispensable. Its recurrent behavior over long time trials helps provide solidity to the statistics gathered in analyses. It also allows the sensitivity analysis of focused changes without swirling background conditions that can destroy understanding of the resulting effects. If only the stop-loss policy is changed in a steady system, attribution is more easily established. An analogy is in trying to assess changes in athlete training without the presence of fluctuations in weight. In other words, effects are easily detected in a system that is otherwise stable.

Stability is not easily achieved, however, when inputs result from snapshots of the system in a given year, but tests are being formed for future conditions. Past behavior (say, of accessions or separations) must be reconciled with future expectations (of force size, structure, and deployment demands). This is not unlike the real system management perpetually carried out by the Army. HRC must use accessed soldiers who have progressed through many years of training and other experience to carry out the changing demands in a current year—and, more challenging still, fit today’s Army into plans for future forces and missions. The extent to which the model must be tuned to conform to its disparate inputs helps gauge the Army’s past, present, and future stresses.

Finally, a stabilized base case provides a test bed that lacks some of the exceptions of the real-world system. Although it could be argued that some realism is lost, the opportunity to see a system operating according to stringent rules is of considerable value. The Army is a

disciplined organization and follows its rules—including the exceptions it officially makes to normal procedures (which are also exceptions that the model can incorporate). To test the desired set of original policies, though, stringency can be effective in exposing design problems. In this case, for instance, backfill is allowed only from “Tier 1” and “Tier 2” units, per HRC specifications. Other units are the designated deployers and are not required to give up soldiers myopically in the short run to the detriment of their own future deployment needs. If a deployment setup does not work, the need to reconfigure the force structure or assignments is highlighted by hindered performance. Similarly, stop-loss policies themselves are stringently applied in their respective test runs.

Setup Details and Assumptions for Base Cases

- FY 2011 547,000-strong force structure (from HRC):
 - Authorizations for E-3 and up only
 - BCTs set as homogeneous, by type, with 36-month cycles (to be tested at shorter lengths)
 - Decomposed by MOS
 - MOS systems to be examined:
 - Infantryman (11B)
 - Unit supply specialist (92Y)
 - Composite of all demanded MOSs
- Rotation schedule (from HRC):
 - 15 concurrent BCTs deployed (6 heavy, 7 infantry, 2 Stryker)
 - Non-BCT deployers for “itty-bitties”
 - Two tiers of units allowed to backfill
- Flow distributions (from FY 2004 and FY 2007 Total Army Personnel Database):
 - Accessions (increased for 547,000-strong system)
 - Promotions
 - Losses
- Personnel stabilization, retirement, and first-term policies (per G-1)
- Stop-loss in effect (Option 10)

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This slide provides additional essential details of the computational base cases. An important note is that force structure and rotational demand data from the Army were specified for grades E-3 and up. Starting at E-3 is an Army coding convention and does not preclude lower-grade soldiers from deploying to help satisfy the needs of the E-3–E-4 category described earlier. Our model remains faithful to the Army coding by tracking all deployments at this level using the Army E-3–E-4 category labeling. The Army allows real-world deployments of E-1–E-2 soldiers in this category, and we allowed this as well.¹ Those in the E-1–E-2 group who did not deploy but remained in service still fed the higher-rank needs appropriately as they promoted to higher grades. Moreover, the accession stream did not include only basic recruits; soldiers with prior service were introduced into the model at grade levels in accordance with recent manpower data.

¹ In fact, the model detected the need for the early soldier contributions. When sensitivity analyses were performed without E-1–E-2 contributions to the E-3–E-4 deployment category (in part, to look at effects of time taken by varying early training), shortfalls required “managing” the process to permit considerable early “promotion” or the use of E-2 soldiers for the E-3 need in order to get the test system into balance. This was relieved (achieving similar deployment performance numbers) by releasing E-1–E-2 soldiers to deploy earlier—aligning with the Army’s practice.

11B Provides Difficult but Illustrative Case Study

MOS 11B (infantryman):

- **Heavily represented in the Army (> 53,000). Shortfalls cannot be attributed to effects of low density.**
- **Provides statistically stable test bed for comparing stop-loss options and costs.**
- **Illustrates tension between authorizations and realities of accession/ promotion process.**
- **Illustrates need for out-of-grade assignments, which HRC manages carefully and may not be able to stretch.**

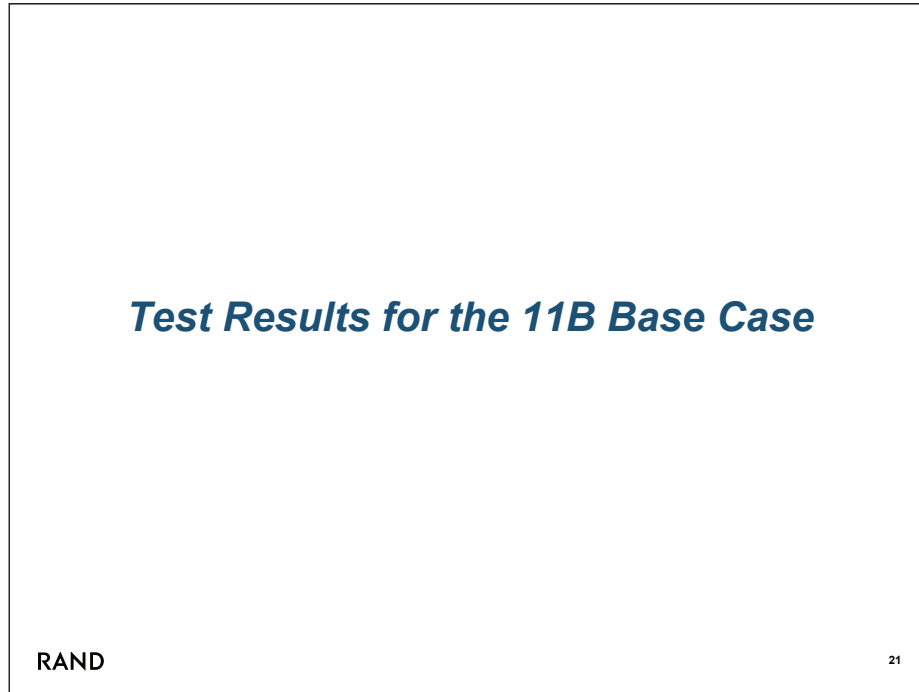
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The first case considered was the 11B (infantryman) MOS. This position is heavily represented in the force, which reduces problems of low density in matching soldiers to units—though it is true that a few types of units have low numbers of these soldiers. The abundance of 11Bs helped enable statistically stable tests. Among the MOSs we examined, it also provided the strongest case for stop-loss, in terms of the loss of certain types of performance when the practice was ceased without choosing carefully from among the stop-loss replacement options.

The reconciliation of the inflow process with authorizations is a challenge in creating a stable simulation base case for the 11B MOS. The tensions between supply and demand require some manipulation of the two, just as the real-world system requires active management of accessions, promotions, and out-of-grade assignments. The modeling overview in the appendix illustrates further the process of obtaining a useful simulation base case.

Test Results for 11B MOS Base Case



This section establishes the performance of the system with stop-loss employed. First are the results for the 11B MOS.

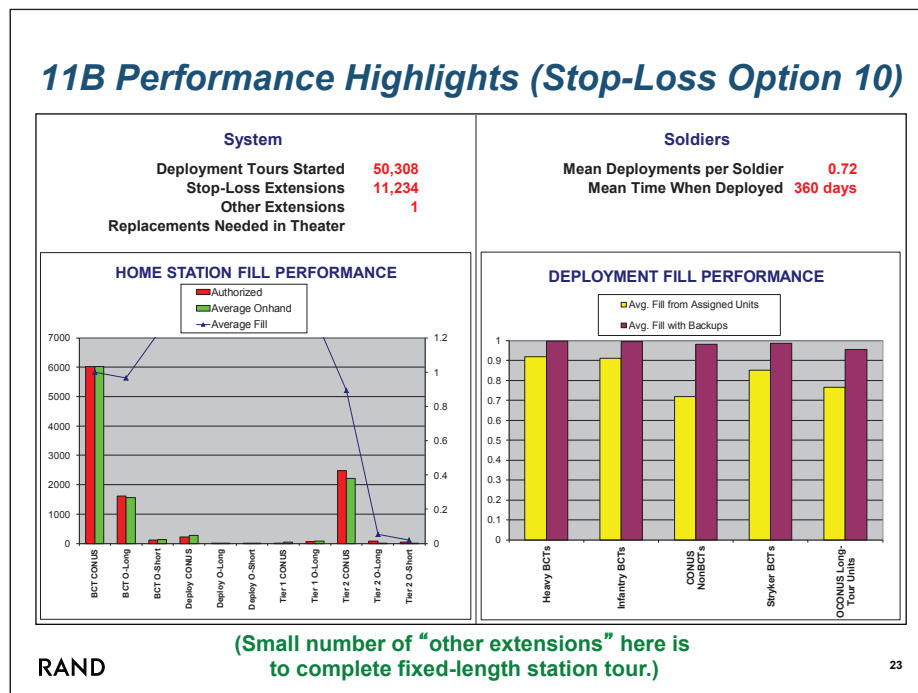
Grade-Balanced vs. Unmanaged System

- **Focus is on relative performance drops.**
 - Options can be compared using either system.
 - **Adjusted and stable case has more performance to lose.**
 - Gives more stringent case in favor of stop-loss.
 - Lends credibility to alternatives that perform well.
 - **Unadjusted system (without grade balancing):**
 - Will have poorer deployment performance.
 - Further performance loss is muted.
 - Need for stop-loss will be understated.
- **Both cases will be examined.**
- **Real-world system balance will be somewhere between the two extremes.**

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The following slides compare the stop-loss system's performance to that of the same system with stop-loss policy altered in various ways, with a focus on the consequent drops in performance—notably, deployed-unit fill rates. The advantages of using a stabilized system that performs well were discussed earlier in this chapter; here, that system has been achieved in the 11B base case. The “unmanaged” system described earlier performed much more poorly, understating the need for stop-loss. Both systems were tested and served as boundary cases for predictions of real-world system performance.



This slide summarizes the performance measures under Option 10 (the full stop-loss base case). Of particular interest is the chart on the right, which shows deployed-unit fill (darker bars), on average, by type of unit assigned to rotations. Fills are weighted across units, according to their strengths. Note that the base-case performance is good, as expected. The lighter bars in the chart show the average percentage of the fill that was provided by principal supplying units assigned to the deployment (as opposed to numbers contributed by backfill from other units). High values for this measure indicate high personnel stability among the troops in theater; they are primarily from the same units that trained together specifically for the deployments.

The chart on the left shows the overall fill rates for units of various types. The numbers are based on whole home-station authorization and on-hand levels without regard for whether or not member soldiers are deployed. There are extraordinary overfill and underfill values for very small units in which a few soldiers above or below the authorization can have a dramatic proportional effect on fill rates.

The measure “mean deployments per soldier” is the number of deployments during soldiers’ careers, averaged across all soldiers over the history of the simulation, without regard for length of career in the Army.

Observation About Soldiers Who Have Never Deployed

- Considerable numbers of soldiers never deploy before separating.
 - For stop-loss Option 10, this number was 30% of 11Bs.
 - In real life, this number is reduced greatly by less-random station assignment choices. Army does well in keeping this number under 10%.
 - Tested below for case without stop-loss.
- Nondeploying soldiers, for a given rotation, included those who were:
 - In early training in the E-1–E-2 ranks
 - In predeployment phase of another BCT's cycle, ineligible to cross-level
 - In a backup unit, but in an unneeded grade or MOS
 - On PCS orders
 - Fenced following prior deployment (does not add to never-deployed number)
 - Fenced from prior assignment
 - Had insufficient time on station
 - Had first-term restriction (restriction relaxed for this study)
 - Promoted after deployment to unneeded grade (relaxed for this study)
 - Wartime-nondeployable (e.g., pregnant, incarcerated)
 - Had impending separation (except when stop-losses).
- Never-deployed soldiers separated before being free of all restrictions.

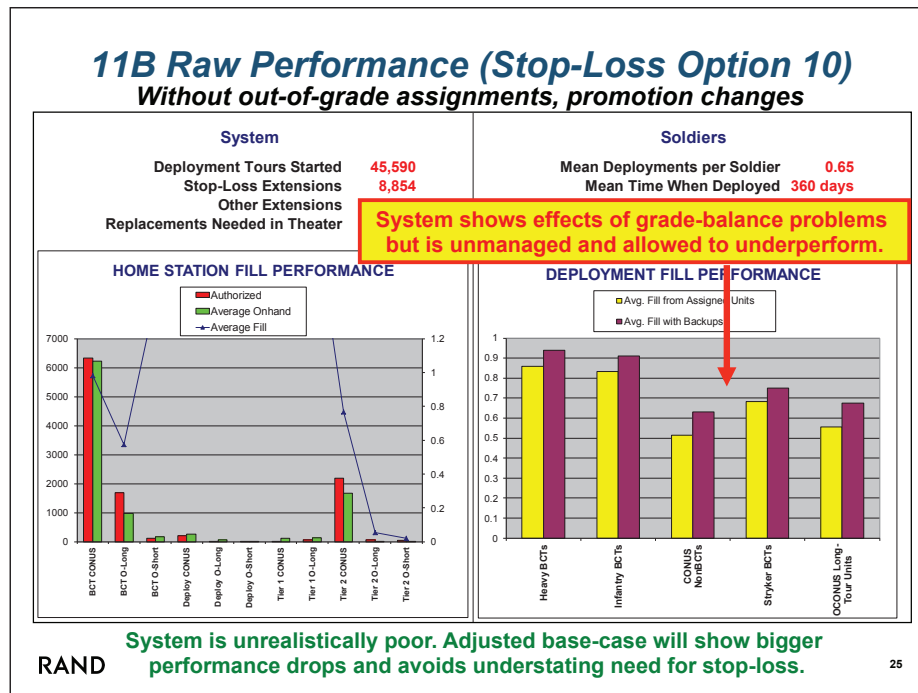
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It is useful to note the percentage of soldiers who did not deploy during their careers. A seemingly inordinate number of real-world soldiers fall into this category, and it is informative to note that the base-case measure was also unexpectedly large—30 percent for the 11B case. With real-life management of personnel assignments, this number would be lower but still significant.

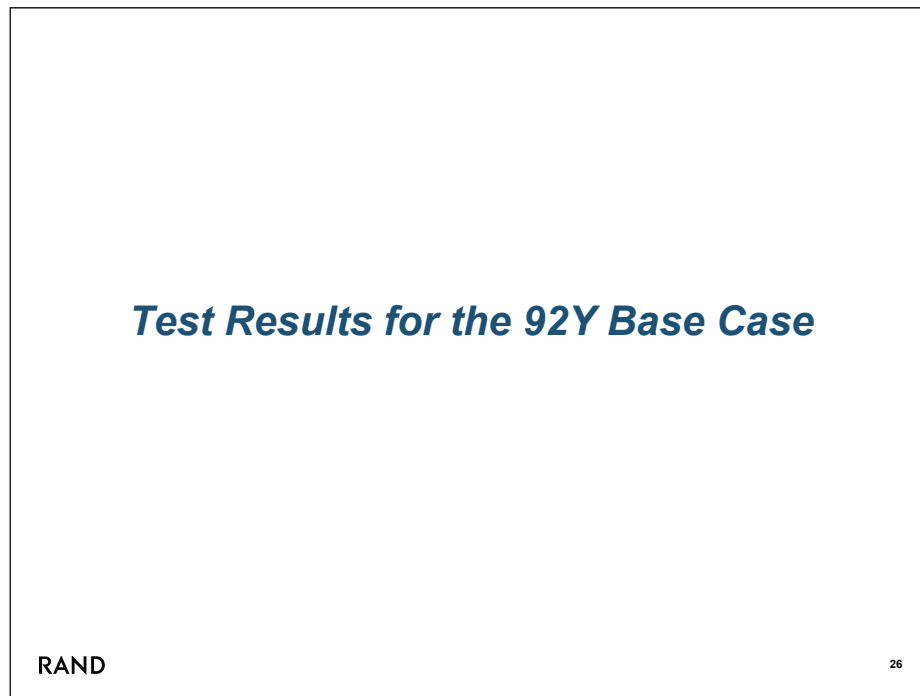
It is nonintuitive that many soldiers never deployed while conditions were such that stop-loss was required for the highest levels of fill performance. Stop-loss itself may contribute to elevating this number, as it reduces deployment churn, so the measure without stop-loss should be examined. The point comes up again in the discussion of Option 1 (no stop-loss; avoid deployment) in Chapter Five.

It is worth noting, for now, the many reasons that an individual soldier might not deploy under a given rotational demand at a given time. A number of these reasons are listed in this slide. A considerable number of soldiers were in one of these conditions at each opportunity for deployment. A string of such conditions can account for an entire career, especially one that lasts only as long as a single enlistment term or less.



This slide shows the performance of the base-case system with no attempts to correct grade-balance problems, including the overall deficit in E-3 and up on-hands. Such an unmanaged system is referred to as “raw.” The poor performance was expected. This “raw” system showed similar declines in deployed-unit fill performance when stop-loss was removed—6.7 percent—but the system had not been managed into reasonable system fill performance to begin with (something HRC would not have allowed in real life). The before and after results, however closely the performance drops match those of the base case, are less comfortable to interpret as a serious representation of the real system. Stabilized, stop-lossed base-case systems more reasonably convey the stresses and successful management already characteristic of the real, functioning system and provided a more stable test bed for the comparison of policy options. They also conservatively avoided understating the case for stop-loss, meaning that real fill declines are likely to be closer to their higher values than to those for the raw, nonstabilized boundary cases.

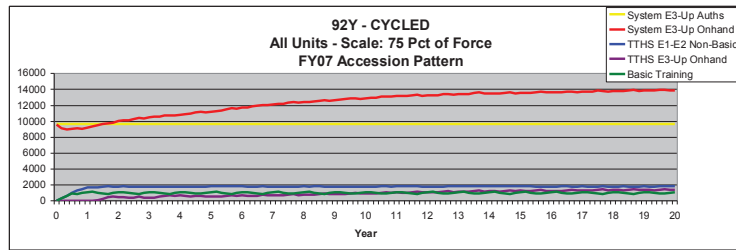
Test Results for 92Y MOS Base Case



This section presents the results of the base-case measures for the 92Y MOS.

92Y Provides Less-Challenging Case

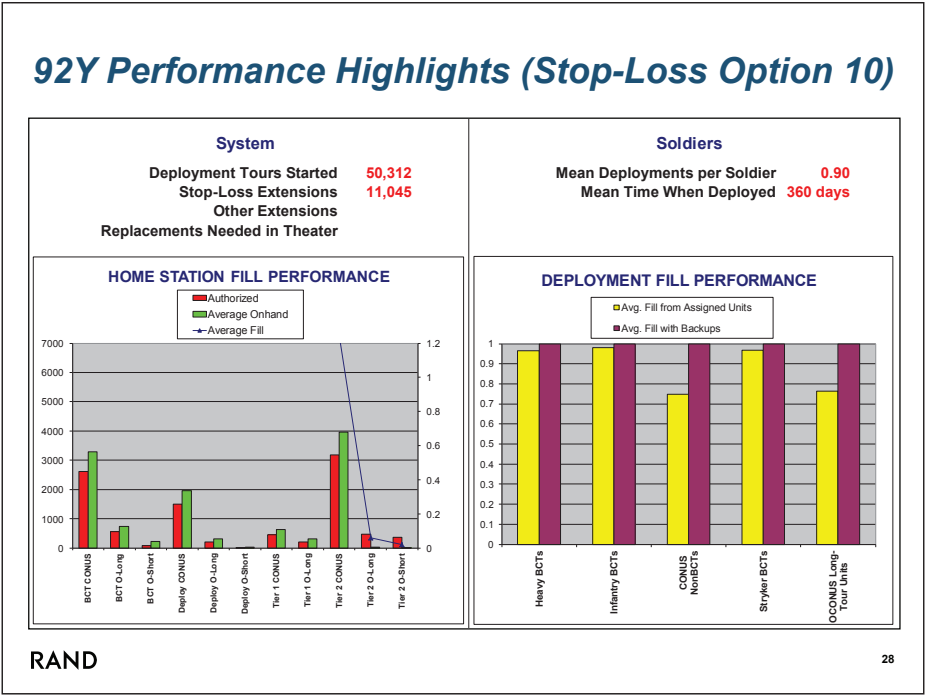
- **92Y (unit supply specialist):**
 - Just under 13,000 in force
 - Grade balance/out-of-grade adjustment about two-thirds that of 11B
 - Accession stream shows growth, not increased for tests
 - Promotions not adjusted for tests



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The 92Y MOS is significantly different from the 11B MOS. The numbers of soldiers are smaller, but they are both ample and growing if recent accession and separation patterns continue. The slide shows on-hand levels as the model tried to operate the system in a steady state for a prolonged period. The red line shows on-hands growing to significantly exceed authorizations (and a steady state not being achieved). In fact, accession rates were held at previous levels, and promotion adjustments were not made in the tests. Out-of-grade assignments were less frequent than for 11B.



The fill performance measures for the 92Y MOS base case are high. Minimal modification of the base case was needed to achieve required grade-wise unit fills, so no “raw” version of 92Y is presented here.

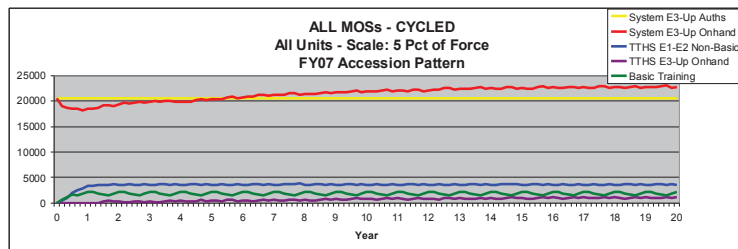
Test Results for Mixed-MOS Base Case



The model also considered a mix of all MOSs. The results of the mixed-MOS studies are presented here for general reference and edification of the option comparisons. The lack of substitutability of skills in theater limits the utility of mixed-MOS conclusions to the comparison of options; the findings cannot be extended to an assessment of the severity of actual performance changes.

Tests on Composite of All MOSs

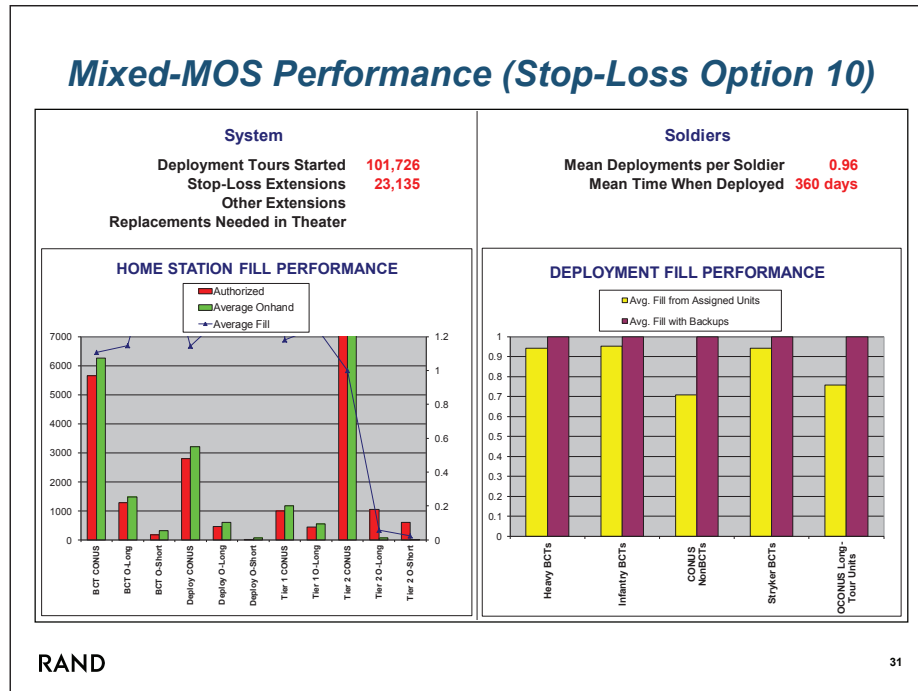
- **Mixed MOS (across force):**
 - **Approximately 413,000 in active enlisted force**
 - **Grade balance/out-of-grade adjustment about three-quarters that of 11B**
 - **Accession stream shows growth, even when not increased for tests**
 - **Promotions adjusted moderately for tests**



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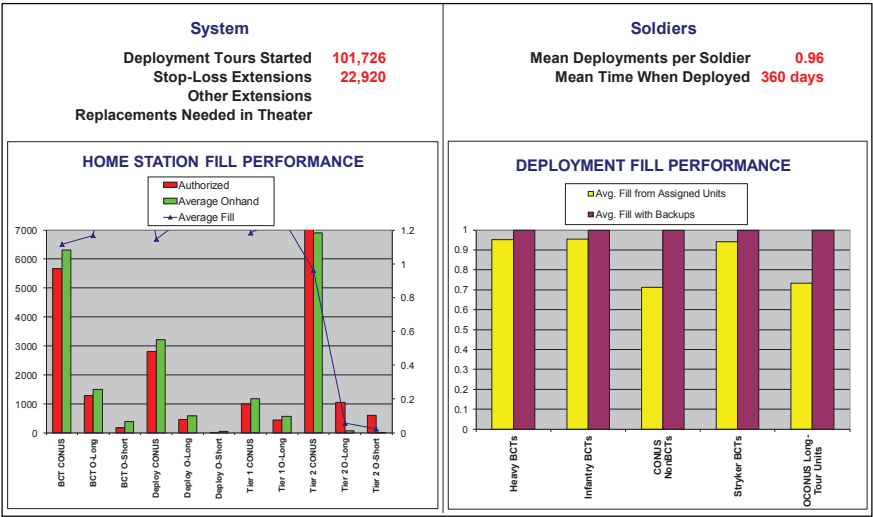
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The overall system, using the given inputs, shows growth similar to that of the 92Y MOS. Again, the red line shows on-hands growing to significantly exceed authorizations (and a steady state not being achieved).



The fill performance measures for the mixed-MOS base case (with stop-loss) are high, as shown in this slide. Caveats for using results from this composite MOS were discussed earlier.

Mixed-MOS Raw Performance (Stop-Loss Option 10)
Without out-of-grade assignments or promotion or accession changes



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The fill performance measures for the mixed-MOS raw case are similarly high and may offer little guidance in distinguishing among the stop-loss alternatives.

Performance of Stop-Loss Alternatives

Objectives of This Briefing

- Discuss stop-loss and present a range of stop-loss policy alternatives.
- Outline a quantitative modeling approach for predicting policy effects on personnel flow and unit condition.
- Present key observations of performance from setup and simulation of base-case systems with stop-loss.
- ➔ • Present effects of alternative stop-loss policies on system performance.
- Discuss “costs” of recovering system performance under alternative stop-loss choices.

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This chapter presents the results of the tests of the alternative stop-loss options.

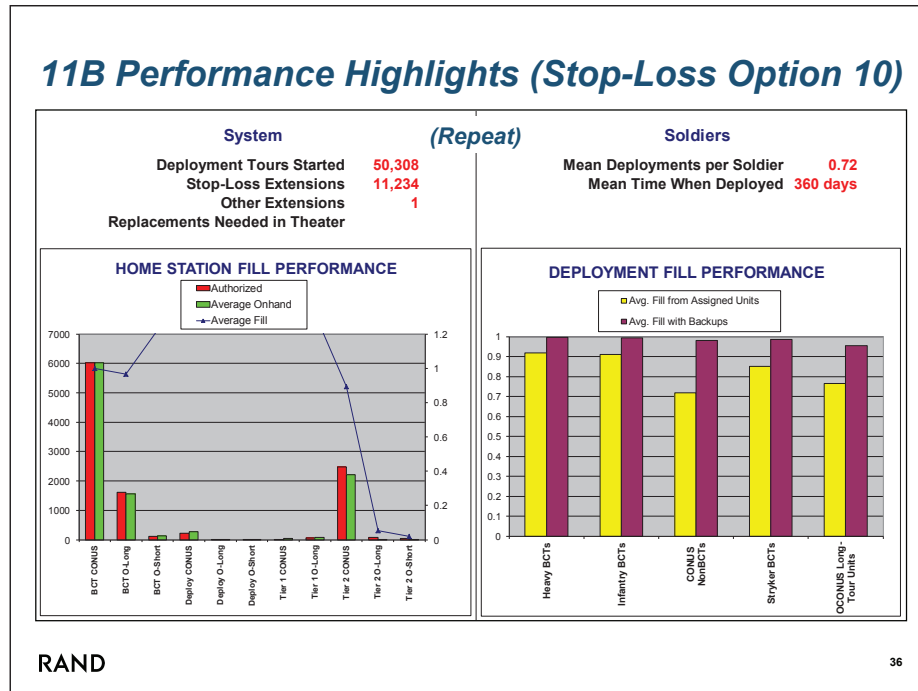
Option Code	<i>Stop-Loss Policy Alternatives</i>
10	• Full stop-loss: Deploy unconditionally; apply stop-loss in theater.
9	• Stop-loss if incentive rejected: Offer monetary incentive to voluntarily extend for full deployment. If not accepted, extend using stop-loss.
7	• No stop-loss; deploy and replace: Deploy unconditionally; use individual replacement in theater. • No stop-loss; conditional deployment: Do not involuntarily extend; deploy based on time of ETS within deployment period according to these rules:
6	– For ETS beyond first 6 months, deploy, then replace in theater. For ETS within first 6 months, do not deploy; replace prior to deployment and bar reenlistment.
5	– For ETS beyond first 6 months, deploy, then replace in theater. For ETS within first 6 months, do not deploy; replace prior to deployment.
1	• No stop-loss; avoid deployment: Do not involuntarily extend or deploy soldier; replace prior to affected deployment.
0	• No stop-loss; incentivize to avoid replacement: Offer monetary incentive to voluntarily extend for full deployment. If not accepted, do not extend or deploy—replace prior to affected deployment.
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This slide listing the stop-loss alternatives and their index numbers is presented again for reference purposes.

Test Results for 11B MOS Stop-Loss Alternatives

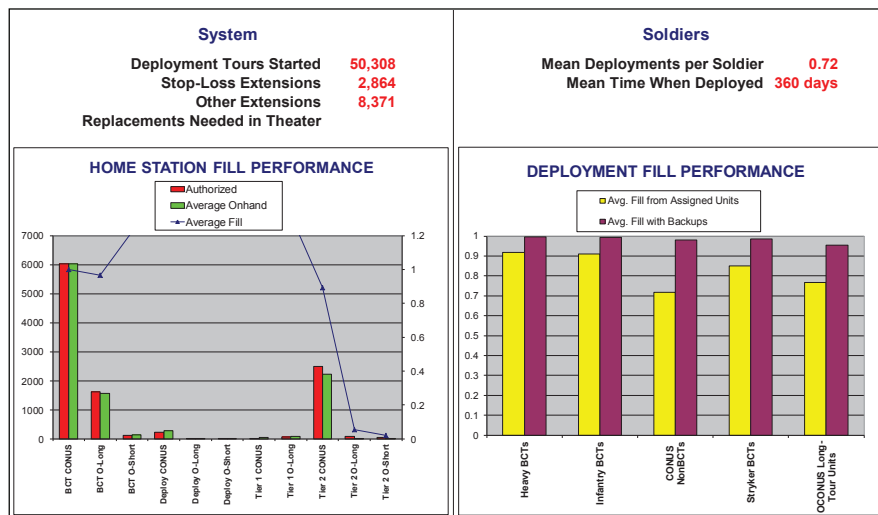


This section examines the performance measures for the stop-loss alternatives for the 11B MOS. Each option is explained, in turn, and followed by summary tables with comparisons.



This slide, providing an overview of the Option 10 (full stop-loss) measures discussed in Chapter Four, is repeated here for reference.

11B Performance Highlights (Stop-Loss Option 9.75*)



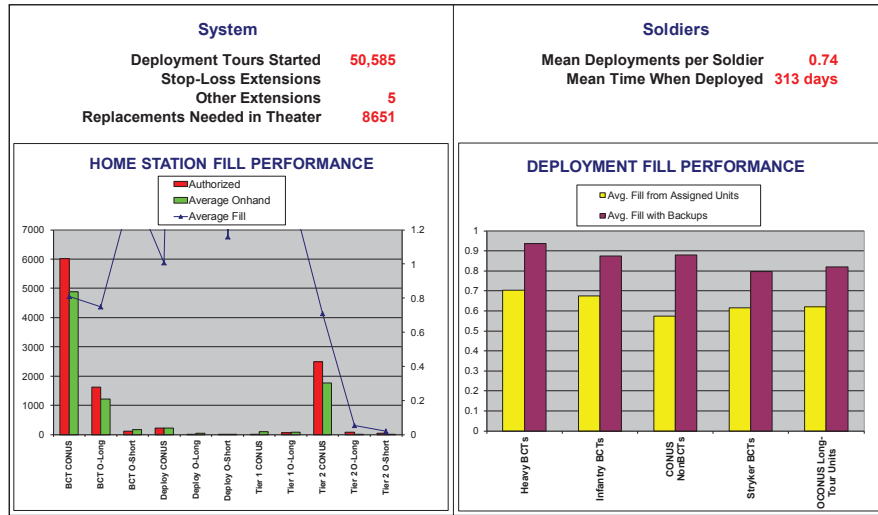
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* Option 9 with 75-percent acceptance rate for bonus

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This slide shows the performance results of Option 9 (stop-loss if incentive is rejected) with an acceptance rate of 75 percent—labeled 9.75. The high acceptance rate shown here is realistic because rejection would mean certain stop-loss for the soldier. The specific performance measures are the same as for Option 10, because the same soldiers are retained. Only the status (stop-loss versus other extension) changes.

11B Performance Highlights (Stop-Loss Option 7)

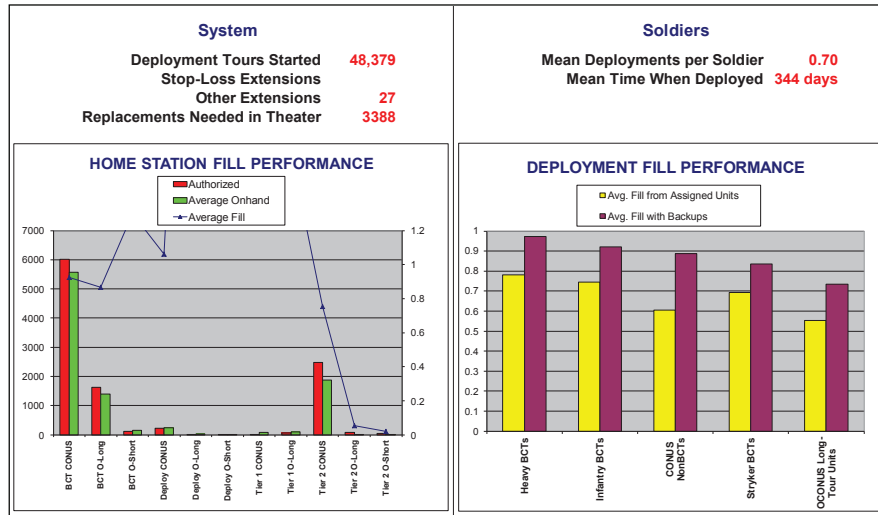


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Under Option 7 (no stop-loss; deploy and replace), deployed-unit fill drops, as shown in the chart on the right, and replacements in theater soar.

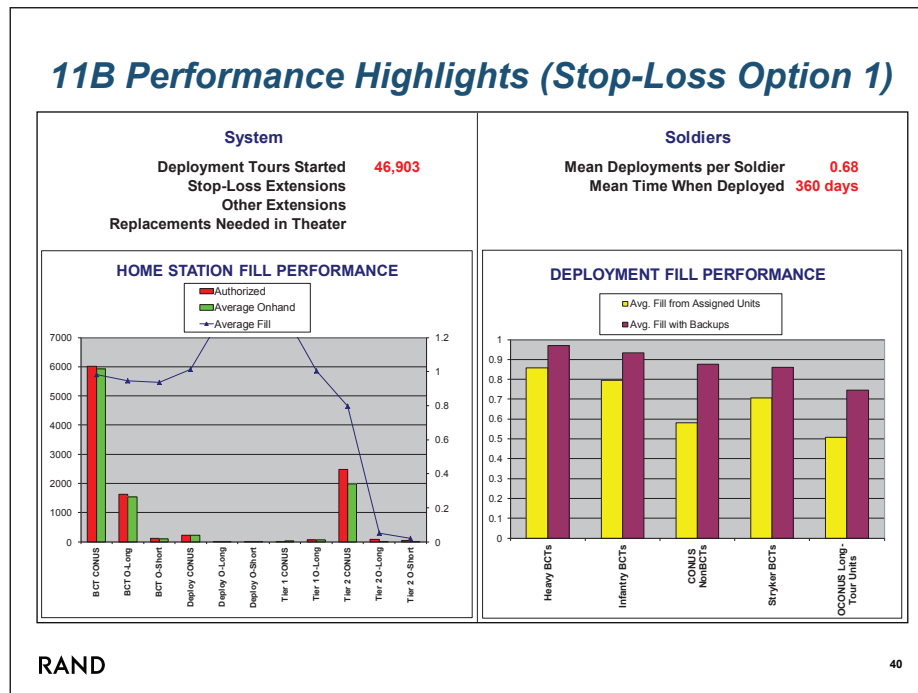
11B Performance Highlights (Stop-Loss Option 5)



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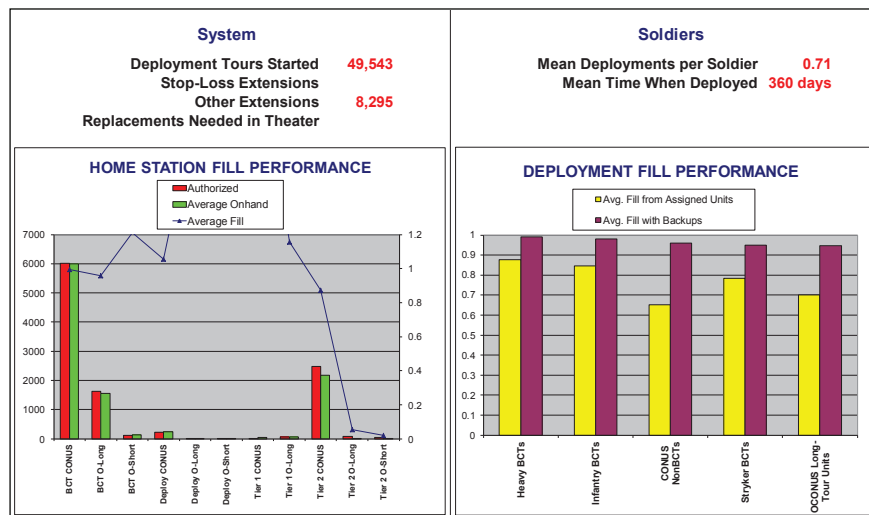
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This slide shows performance under Option 5 (no stop-loss, conditional deployment, for ETS beyond first six months, deploy then replace in theater; for ETS within first six months, do not deploy; replace prior to deployment). With fewer deployments of separating soldiers than under Option 7, replacements in theater drop. General fill performance is similar to that under Option 7.



Under Option 1 (no stop-loss; avoid deployment), there are no stop-losses or replacements of separating soldiers in theater, but fill performance drops to the lowest level of the options thus far (a distinction Option 1 will maintain).

11B Performance Highlights (Stop-Loss Option 0.50*)



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* Option 0 with 50-percent acceptance rate for bonus

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Option 0.50 is Option 0 (no stop loss; incentivize to avoid replacement) with a 50-percent acceptance rate. There are extensions (and bonus costs apply). The deployed-unit fill drop is a fraction of that for Option 1, as shown in the graph on the right.

Testing an Additional Acceptance Rate for Option 0

Option 0 (reenlistment bonus to extend):

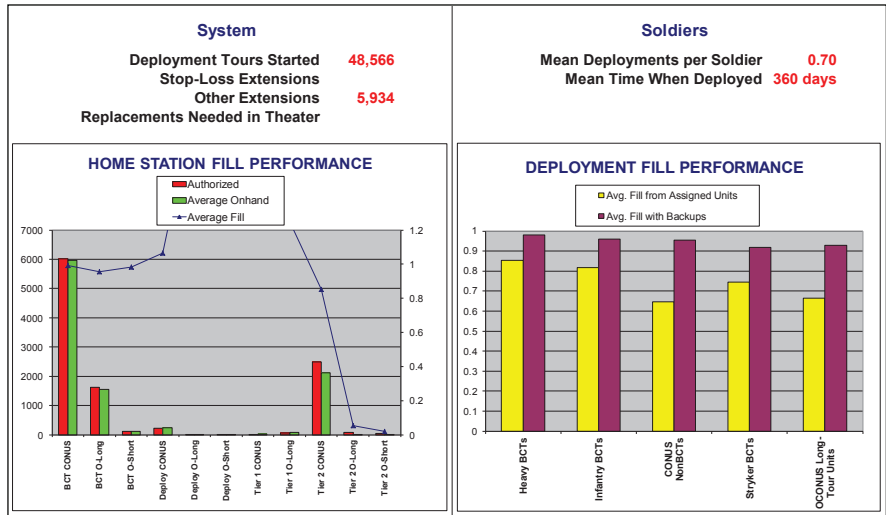
- **Has favorable performance without any stop-losses.**
- **Acceptance rate of 50% tested due to Army culture of willingness to go with team, but rate could be overstated.**
- **(Zero acceptance rate equivalent to Option 1.)**
- **Tests of 25% acceptance rate to follow...**

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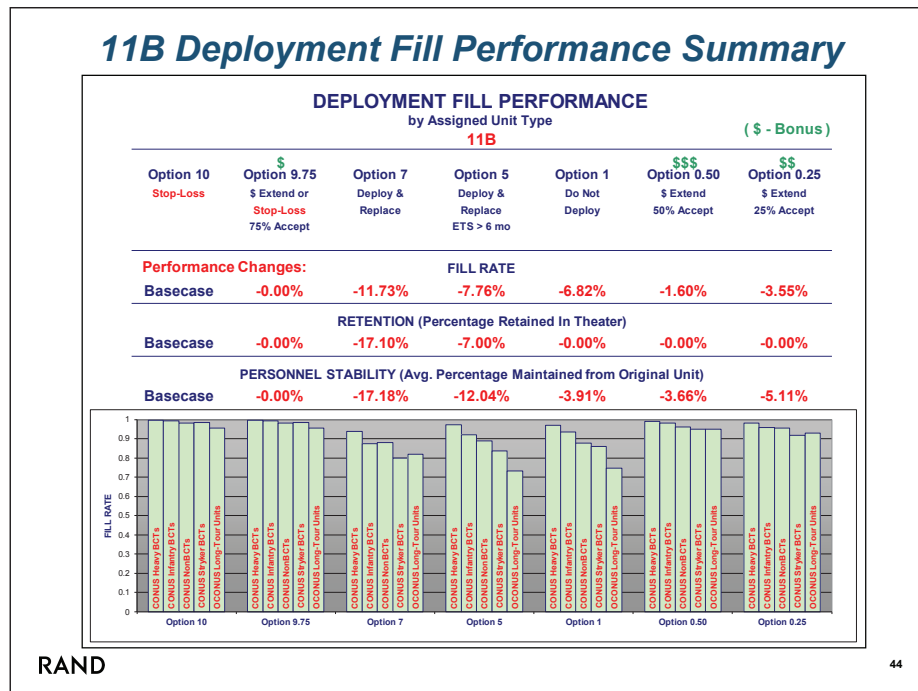
The good relative deployed-unit fill performance, with no stop-loss, of Option 0.50 calls for a closer examination of Option 0 with other acceptance rates. Fifty percent could be optimistically high, so the model also considered a 25-percent acceptance rate. (Here, a 0-percent acceptance rate would make Option 0 equivalent to Option 1.)

11B Performance Highlights (Stop-Loss Option 0.25*)



RAND * Option 0 with 25-percent acceptance rate for bonus 43

Option 0.25 is Option 0 (no stop-loss; incentivize to avoid replacement) with a 25-percent acceptance rate. There are extensions (and bonus costs apply). The deployed-unit fill drop is a fraction of that for Option 1, as shown in the graph on the right, but the drop exceeds that under Option 0.50, as expected.



This slide presents the deployment performance summary for the 11B MOS. The most viable non-stop-loss options were incentivized short reenlistments at either of their tested acceptance rates, under which deployed-unit fill performance gaps were modest. As shown in this slide, fill rates were computed as drops or increases from the corresponding results for Option 10. For the 11B base case, simply ceasing stop-loss (Option 1) resulted in a 6.8-percent drop in the fill rate (an absolute drop from 99.1 percent to 92.3 percent). This drop was cut by nearly half when 25 percent accepted the reenlistment offer of Option 0. Were a 50-percent acceptance achieved (through more generous bonuses, for example), the drop could be reduced by more than 76 percent—to just 1.6 percent. The in-theater replacements in Options 7 and 5 caused these options to perform worse than Option 1, making them nonviable for this scenario.

The model considered additional performance measures for each option. It measured personnel stability by determining the percentage of unit fill that is provided by the original supplying unit. It is the ratio of number of soldiers who deployed from the principal unit at any time during the deployment to the number of soldiers supplied by all units at any time during the deployment. In this way, the model counts each occurrence of a new-to-unit soldier; it does not measure the amount of time that deployed units are composed of soldiers from disparate home units. This measure dropped by as much as 17 percent under Option 7 (no stop-loss; deploy and replace), which sends all soldiers to theater without regard for their impending separations. There was a 12-percent drop under Option 5. These drops were reduced to only 3.7 percent and 5.1 percent for the incentivized reenlistment options with 50- and 25-percent acceptance, respectively. In-theater retention, of course, mirrors these findings, with Options 7 and 5 being the natural worst performers with their in-theater replacements.

11B Detailed Comparative Measures

Measure	Option 10: Stop-Loss	Option 9.75: \$ Extend or Stop-Loss 75% Accept	Option 7: Deploy & Replace	Option 5: Deploy & Replace ETS > 6 mos.	Option 1: Do Not Deploy	Option 0.50: \$ Extend 50% Accept	Option 0.25: \$ Extend 25% Accept
Overall fill rate	99.11%	99.11%	87.38%	91.35%	92.29%	97.50%	95.56%
Change	—	−0.00%	−11.73%	−7.76%	−6.82%	−1.60%	−3.55%
Individual deployments	50,308	50,308	50,585	48,379	46,903	49,543	48,566
Change	—	−0.00%	+0.55%	−3.83%	−6.77%	−1.52%	−3.46%
Stop-loss extensions	11,234	2,864	0	0	0	0	0
Change	—	−74.51%	−100.00%	−100.00%	−100.00%	−100.00%	−100.00%
Retention in theater	100.00%	100.00%	82.90%	93.00%	100.00%	100.00%	100.00%
Change	—	−0.00%	−17.10%	−7.00%	−0.00%	−0.00%	−0.00%
Stability from original unit	92.27%	92.27%	75.09%	80.23%	88.37%	88.61%	87.17%
Change	—	−0.00%	−17.18%	−12.04%	−3.91%	−3.66%	−5.11%

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This slide presents a more comprehensive performance summary for the 11B MOS under each option. It also includes fill-rate levels and counts for deployments and extensions.

Soldiers Never Deployed (Without Stop-Loss)

- **For Option 1 (simple cessation of stop-loss):**
 - Performance drop was accompanied by a rise in never-deployed soldiers (to 37% for 11B).
 - Nondeploy decisions, as noted above, were confirmed.
- **Nonintuitive combination of nondeployed soldiers and unmet needs was challenged with tests to enforce deployment equity and seek performance gains.**
- **Equity challenges did not change performance and did little to change deployment equity, given present unit manning patterns:**
 - Once soldiers were in place at their stations, changing deployment assignment rules resulted in few opportunities to equalize picks.
 - All available personnel at all eligible stations were already being sought, and insufficient numbers were found, regardless of deployment histories.
 - Equity rules competed with choice of best-trained soldiers, as measured by time with unit.
 - Equity issue potentially addressable with long-term PCS scheduling but does not translate to provision of more soldiers for deployments—this is separate from the direct stop-loss issue.

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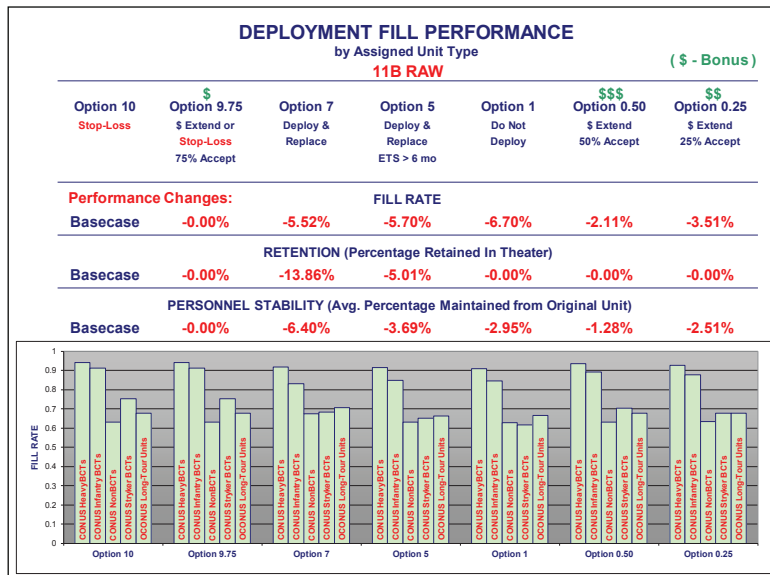
As discussed earlier, the model included a measure of never-deployed soldiers for Option 1. With the lost deployed-unit fill performance under no stop-loss, fewer soldiers deployed and the percentage of never-deployed soldiers rose to 37 percent. It was uncertain whether dropping stop-loss might allow a broader collection of soldiers to deploy or whether fewer would deploy without the enforcement. The latter case held, with the percentage of never-deployed soldiers rising to 37 percent. As mentioned earlier, this figure is reduced greatly in the real system, as more equitable assignments can be made by the personnel management system. However, an unexpected number of soldiers (as much as a tenth) never deploy, even with stop-loss.

That this phenomenon occurred alongside unmet need in theater was counterintuitive, so it was challenged with tests of the affected soldiers themselves and of the rules for deployment assignments. First, the model sampled many never-deployed simulated soldiers and examined their career histories to confirm that the conditions for their nondeployment followed the rules consistently. Second, instead of choosing soldiers at a station in a first-in/first-out fashion for deployment, the rule was changed to first select the soldiers who had the longest times since deployment (or had not deployed at all). This test did not yield fill performance improvements, and, remarkably, did little to spread the deployments more equitably across the force. The reason is simple: In the needy condition of trying to maintain theater fill levels, all eligible soldiers were sought systemwide. All soldiers who could deploy, according to the rules set forth earlier, did deploy. This was the same group, regardless of whether they were chosen first based on deployment experience or time on station. (In fact, if this reshuffling of personnel had occurred, the soldiers who had trained with the unit the longest might have been overlooked for deployment.)

As noted, long-term preplanning of PCS moves might better position soldiers to more equitably deploy the force. However, if unit authorizations and rotational demands are unchanged, this move alone will not put more soldiers into a position to deploy when needed. The identities of those who were available would change, but the sheer numbers of soldiers would not. As

long as the system seeks out all soldiers who can be used, the equity issue is not directly related to the stop-loss problem, and the notable measure of never-deployed soldiers does not point to unreasonable use of a measure such as stop-loss.

11B Raw Deployment Fill Performance Summary



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11B Raw Detailed Comparative Measures

Measure	Option 10: Stop-Loss	Option 9.75: \$ Extend or Stop-Loss 75% Accept	Option 7: Deploy & Replace	Option 5: Deploy & Replace ETS > 6 mos.	Option 1: Do Not Deploy	Option 0.50: \$ Extend 50% Accept	Option 0.25: \$ Extend 25% Accept
Overall fill rate	86.65%	86.65%	81.13%	80.95%	79.95%	84.54%	83.14%
Change	—	-0.00%	-5.52%	-5.70%	-6.70%	-2.11%	-3.51%
Individual deployments	45,590	45,590	47,930	43,972	42,092	44,474	43,694
Change	—	-0.00%	+5.13%	-3.55%	-7.67%	-2.45%	-4.16%
Stop-loss extensions	8,854	2,195	0	0	0	0	0
Change	—	-75.21%	-100.00%	-100.00%	-100.00%	-100.00%	-100.00%
Retention in theater	100.00%	100.00%	86.14%	94.99%	100.00%	100.00%	100.00%
Change	—	-0.00%	-13.86%	-5.01%	-0.00%	-0.00%	-0.00%
Stability from original unit	91.27%	91.27%	84.86%	87.58%	88.31%	89.98%	88.76%
Change	—	-0.00%	-6.40%	-3.69%	-2.95%	-1.28%	-2.51%

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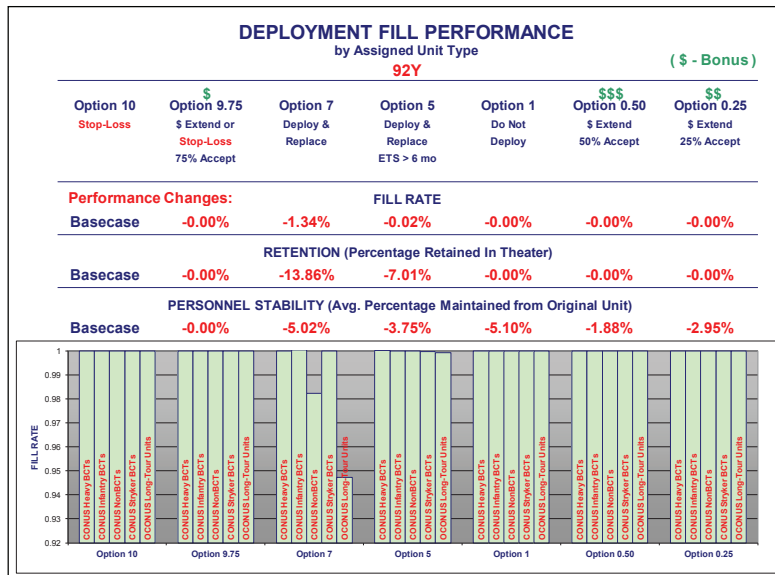
As indicated earlier, the raw case has poor performance for the measures shown, with correspondingly low performance drops, understating the need for stop-loss.

Test Results for MOS 92Y Stop-Loss Alternatives



This section examines the performance measures for the stop-loss alternatives for the 92Y MOS.

92Y Deployment Fill Performance Summary



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92Y Detailed Comparative Measures

Measure	Option 10: Stop-Loss	Option 9.75: \$ Extend or Stop-Loss 75% Accept	Option 7: Deploy & Replace	Option 5: Deploy & Replace ETS > 6 mos.	Option 1 Do Not Deploy	Option 0.50: \$ Extend 50% Accept	Option 0.25: \$ Extend 25% Accept
Overall fill rate	100.00%	100.00%	98.66%	99.98%	100.00%	100.00%	100.00%
Change	—	-0.00%	-1.34%	-0.02%	-0.00%	-0.00%	-0.00%
Individual deployments	50,312	50,312	56,643	53,447	50,312	50,312	50,312
Change	—	-0.00%	+12.58%	+6.23%	-0.00%	-0.00%	-0.00%
Stop-loss extensions	11,045	2,672	0	0	0	0	0
Change	—	-75.81%	-100.00%	-100.00%	-100.00%	-100.00%	-100.00%
Retention in theater	100.00%	100.00%	86.14%	92.99%	100.00%	100.00%	100.00%
Change	—	-0.00%	-13.86%	-7.01%	-0.00%	-0.00%	-0.00%
Stability from original unit	96.50%	96.50%	91.48%	92.75%	91.41%	94.62%	93.56%
Change	—	-0.00%	-5.02%	-3.75%	- 5.10%	-1.88%	-2.95%

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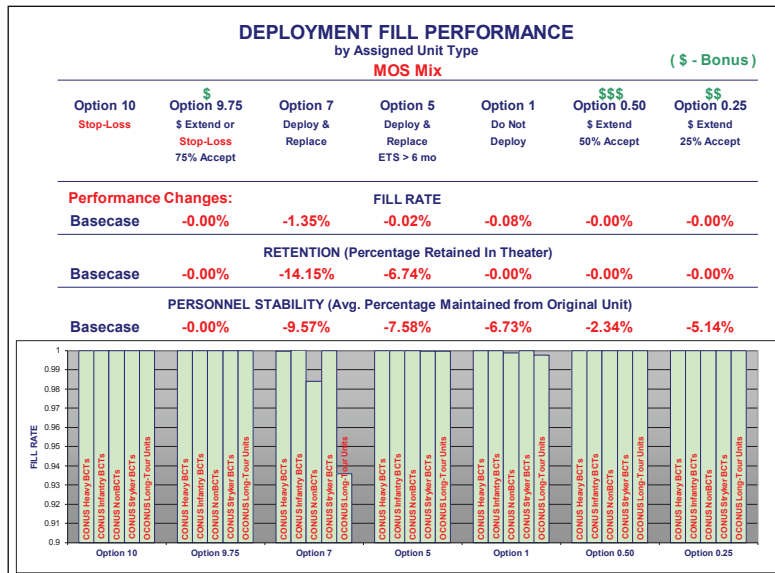
As expected, performance drops were slight for the amply supplied 92Y MOS.

Test Results for Mixed MOS Stop-Loss Alternatives



This section examines the performance measures for stop-loss alternatives for the mixed-MOS case.

Mixed-MOS Deployment Fill Performance Summary



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Mixed-MOS Detailed Comparative Measures

Measure	Option 10 Stop-Loss	Option 9.75: \$ Extend or Stop-Loss 75% Accept	Option 7: Deploy & Replace	Option 5: Deploy & Replace ETS > 6 mos.	Option 1: Do Not Deploy	Option 0.50: \$ Extend 50% Accept	Option 0.25 \$ Extend 25% Accept
Overall fill rate	100.00%	100.00%	98.65%	99.98%	99.92%	100.00%	100.00%
Change	—	-0.00%	-1.35%	-0.02%	-0.08%	-0.00%	-0.00%
Individual deployments	101,726	101,726	114,813	107,821	101,726	101,726	101,726
Change	—	-0.00%	+12.86%	+5.99%	-0.00%	-0.00%	-0.00%
Stop-loss extensions	23,135	5,747	0	0	0	0	0
Change	—	-75.16%	-100.00%	-100.00%	-100.00%	-100.00%	-100.00%
Retention in theater	100.00%	100.00%	85.85%	93.26%	100.00%	100.00%	100.00%
Change	—	-0.00%	-14.15%	-6.74%	-0.00%	-0.00%	-0.00%
Stability from original unit	94.07%	94.07%	84.50%	86.49%	87.34%	91.73%	88.93%
Change	—	-0.00%	-9.57%	-7.58%	-6.73%	-2.34%	-5.14%

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For the measures shown, performance drops were slight for the overall system. However, stop-loss was not applied to a fully substitutable system, so caution is advised in interpreting the results shown here.

Retaining Performance with Stop-Loss Alternatives

Objectives of This Briefing

- Discuss stop-loss and present a range of stop-loss policy alternatives.
- Outline a quantitative modeling approach for predicting policy effects on personnel flow and unit condition.
- Present key observations of performance from setup and simulation of base-case systems with stop-loss.
- Present effects of alternative stop-loss policies on system performance.
- ➔ • Discuss “costs” of recovering system performance under alternative stop-loss choices.

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This chapter turns to the performance tests of the stop-loss alternatives and recovery of performance from stop-loss cessation.

Increased 11B Accessions Lag Performance Drop (Effects Also Delayed During Career Progress)



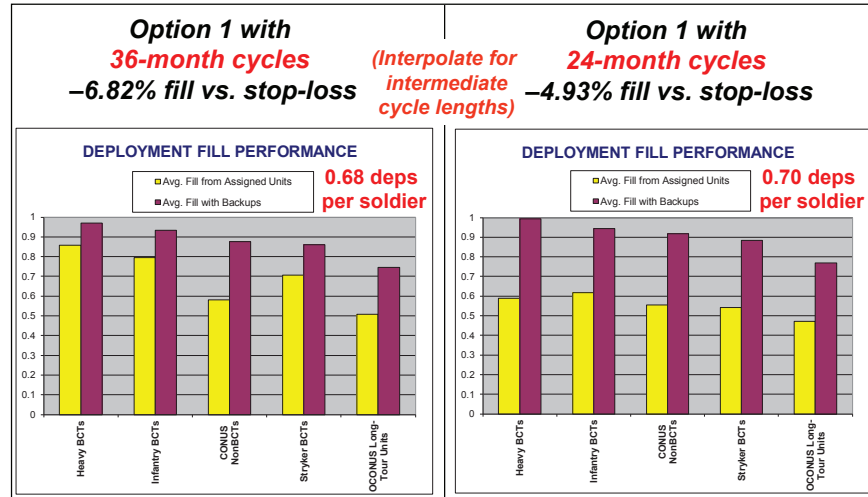
But previous accessions already represent growth
(to 547,000-strong system); may be hard to additionally increase accessions.

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Before this briefing concludes the comparison of the candidate stop-loss proposals, this slide shows the outcomes of tests of other beneficial practices that can help improve deployed-unit fill. The need to increase accessions comes to mind when deficits appear in the system. However, the first benefit of increased accessions is delayed by the long training period for newly enlisted soldiers. This greatly reduces the viability of such an approach in the present situation. Moreover, the results shown here already include increased accessions representing the move to a larger system. Finally, it is important to understand that a soldier added to the general system does not translate directly into a soldier who is present at the right location and at the precise time of need. As an illustration of this, the absolute drop (6.82 percent) in deployed-unit fill performance for Option 1 (simple removal of stop-loss) was matched, via testing, with an even higher percentage *increase* in accessions (10 percent). Little of the performance loss was recovered when the accession effects were felt; the fill rate loss remained at 5.89 percent.

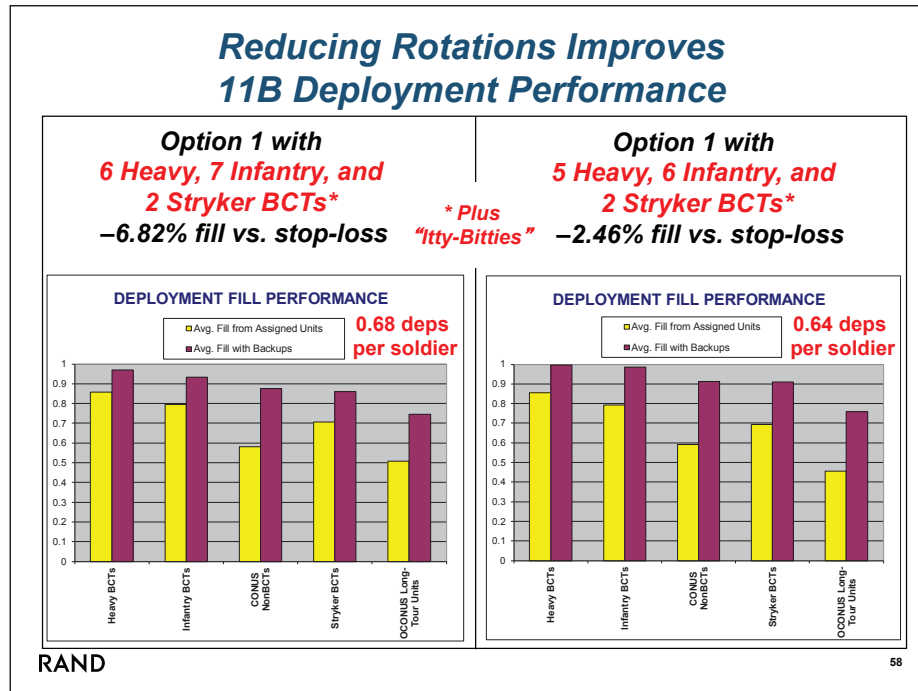
Shortening of BCT Cycles Improves 11B Deployment Performance



But cost is in increased BCT tempo and personnel tempo.
RAND Also, the Army is already employing this approach; hard to push more.

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Major operational changes have a more direct impact. One such approach is to reduce the length of BCT cycles. This increases flexibility in finding a deployable soldier at a given time. The nominal tests shown in this slide used 36-month cycles, but the Army has already begun to reduce this length. It is difficult to create steady states with repeated deployment patterns using arbitrary cycle lengths in the model. But, as an illustrative limiting case, the BCT cycle length was reduced to 24 months, resulting in the significant fill performance improvement shown here. The 6.8-percent drop for Option 1 was reduced to less than 5 percent. Interpolation of the results for the 36- and 24-month cycles can help predict the effects of other cycle times, but the message is clear that the move is effective (at the possible sacrifice of some unit stabilization goals).



Another fruitful operational change is the reduction of individual deployment tempo. When the number of concurrently deployed *units* is reduced, deployed-unit fill rate losses from the cessation of stop-loss naturally decrease. This slide shows the results of a test of the Option 1 system, which represents the simple removal of stop-loss. The drop is reduced by more than two-thirds when one heavy BCT and one infantry BCT are removed from the rotational schedule.

The hope, of course, is that the world can change to allow such an operational change and that its positive effects would be verified through testing. With this in mind, the remaining slides in this chapter return to comparing the candidate stop-loss alternatives.

Short-Term Reenlistments Offer Highest Recovery Without Residual Stop-Losses

Measure	11B		MOS Mix	
	Option 0.50: \$ Extend 50% Accept	Option 0.25: \$ Extend 25% Accept	Option 0.50: \$ Extend 50% Accept	Option 0.25: \$ Extend 25% Accept
Overall fill rate	97.50%	95.56%	100.00%	100.00%
Change	-1.60%	-3.55%	-0.00%	-0.00%
Individual deployments	49,543	48,566	101,726	101,726
Change	-1.52%	-3.46%	-0.00%	-0.00%
Stop-loss extensions	0	0	0	0
Change	-100.00%	-100.00%	-100.00%	-100.00%
Retention in theater	100.00%	100.00%	100.00%	100.00%
Change	-0.00%	-0.00%	-0.00%	-0.00%
Stability from original unit	88.61%	87.17%	91.73%	88.93%
Change	-3.66%	-5.11%	-2.34%	-5.14%

RAND *Financial cost but avoids extra accessions, stop-losses, and loss of stability.*

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This slide summarizes the performance of the two variants of Option 0 from the 11B and mixed-MOS tests. As noted earlier, the performance recovery from reenlisting soldiers is significant in the meaningful 11B case. The financial costs for the incentive system can be sizable (and, of course, are related directly to the acceptance rate), but the option considerably avoids extra accessions and loss of personnel stability, and it includes the cessation of stop-loss.

Options for Stop-Loss Cessation

- **Separation delays**
 - **Most efficient (and only) direct replacement for stop-loss**
 - **Highest-performing options do just this:**
 - **Option 9 removes portion of stop-loss from books, but under duress (threat of stop-loss upon rejection of offer).**
 - **Option 0 removes portion of stop-loss, fully voluntarily**
 - **Moderately acceptance rate recovers much of performance**
 - **Cost is in higher bonuses than Option 9**
 - **Further lengthening of time of service through longer enlistment periods, etc., defers to future**
- **Accession increases**
 - **Would add to already increased growth rates**
 - **Benefits delayed to future**
- **Other changes**
 - **System balancing (toward base case), when possible**
 - **Decreased tempo/reduced rotations**
 - **Shortening of BCT cycle lengths**

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As observed earlier, short of major operational changes, separation delays are the most effective replacement for stop-loss. Among the options that do this, the highest performer is Option 9, which offers a bonus to extend but imposes stop-loss if the offer is rejected. This removes a portion of stop-losses from the books but does not do away with the practice altogether. Option 0 involves incentives to reenlist for the deployment period without the threat of stop-loss. The bonus payments would need to be higher than for Option 9, but with moderate acceptance rates, this stop-loss-free option is highly effective.

Other means to delay separations, such as through longer initial enlistment contracts, would also be helpful, but effects would be delayed by the training periods for new recruits under such arrangements. Also beneficial would be continuing the Army's previously referenced, ongoing practices to reduce stresses within the system in matching soldier inventory to authorizations.

Finally, increased accessions and the operational changes of reducing the number of units deployed at a given time, as well as shortening the BCT length, were also considered. Increases in accessions would not be beneficial for a considerable amount of time. Stepped-up recruitment is already figured into the analysis, as the Army is moving toward a larger system. Decreased rotations and shortened BCT cycles are quite helpful but can be operationally difficult. They can be used in conjunction with Option 0 when conditions permit. When deployment tempo reduces dramatically, of course, even the reenlistment incentives might be dropped.

Conclusions

Conclusions

- **Effects of stop-loss cessation vary across tested MOSs**
 - 11B deployment fill rate suffers up to 6.8% with full cessation
 - 92Y is mostly unaffected at reported inflow-outflow
 - Mix of all MOSs shows similar small change
- **Performance is maintained if stop-loss is forced when soldier rejects short reenlistment (Option 9), but this option leaves stop-loss intact at a lowered level.**
- **The most viable non-stop-loss options are incentivized short reenlistments for otherwise separating soldiers (Option 0); recovery gap is quantitatively modest, given moderate acceptance of the incentives.**
- **Relative results are robust across test scenarios, but combining Army force and rotation plan with projected flow data indicates that system will remain stressed to meet grade-wise demands. This cautions against options that go beyond replacing stop-loss with a direct alternative separation delay. Accession increases and out-of-grade assignments can be effective, but are already heavily employed. Accession changes are not immediately helpful.**
- **Shortened BCT cycles are effective, as are rotation reductions. These operational changes can augment—and ultimately replace—the chosen stop-loss alternative.**

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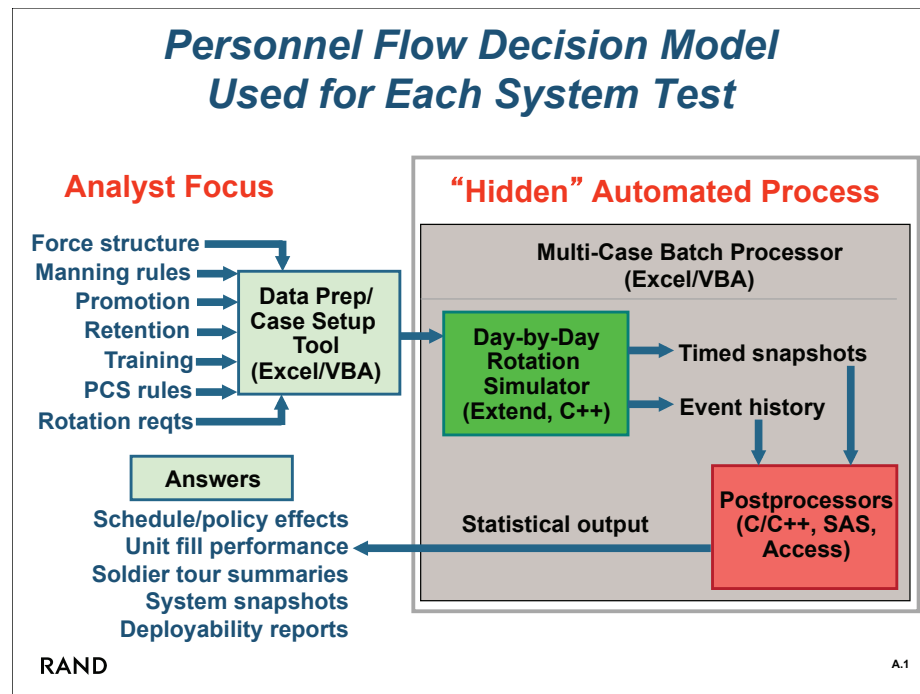
The effects of stop-loss cessation varied across the tested MOSs. Of the three MOS scenarios tested, 11B deployed-unit fill performance suffered most when stop-loss was removed. The fill performance of the 92Y MOS, which is amply supplied, was mostly unaffected. The mix of all MOSs showed similar small changes in fill performance, but one must use caution in interpreting the results to avoid underestimating the need for a stop-loss approach.

For the informative MOS, 11B, relative results are robust across test scenarios, but combining projected Army force structure and its rotation plan with projected flow data indicated that the system would remain stressed to meet grade-wise demands. This cautions against considering only options that do not replace stop-loss with some alternative separation delay. Deployed-unit fill was best maintained for Option 9 (stop-loss if incentive is rejected). Indeed, as there was no choice to avoid deployment, exactly the same soldiers were retained as in the full stop-loss case (Option 10); only the status of some soldiers was altered at the cost of offering reenlistment bonuses. This option leaves stop-loss intact at a lowered level and therefore cannot offer the possible intangible benefits of reversing the policy, however one might evaluate them.

The most viable non-stop-loss options were incentivized short reenlistments at either of their tested acceptance rates; the deployed-unit fill performance gaps were modest, quantitatively, and suggest a path out of the stop-loss imbroglio.

DoD's stated desire from the outset of this research was to cease stop-loss if deleterious quantitative effects of the type investigated here could be comfortably ruled out. With the modest performance sacrifices required under the incentivized reenlistment plans studied, it is recommended that such a plan be implemented and that stop-loss be shelved.

Overview of the Simulation Model



The quantitative analyses for this study employed a complex modeling methodology, described briefly in Chapter Three. This appendix provides a brief narrative introduction to the modeling methodology, which substantially extends an approach used for the quantitative portions of several earlier Army manpower studies conducted by RAND (see, e.g., Lussier et al., 2003; Davis et al., 2005; Brady, Orvis, and Lippiatt, 2008).

The full model-based decision system is available to the analyst as a “black box” that captures extensive user descriptions of the personnel system structure and policies and produces an extensive list of outputs to describe the expected responses of the personnel system. Each case involved preparing more than 100 worksheets of input data and feeding dozens of files into the simulator, which contained tens of thousands of specialized code statements; postprocessing involved several specially designed programs and many dozens of database queries of the simulator outputs. The design and testing of the base cases involved more than 1,000 case preparations and runs.

The inputs to the model can be tailored to address numerous policy questions, and the simulator at the heart of the system is designed to conform its representation of the personnel system accordingly. The worksheet-based input “front end” controls the simulator (including

the stop-loss options) and configures the manpower system—its planned force structure and size; seasonally sensitive accession patterns; promotion and separation behaviors; personnel rules for training times, PCSs, and deployment decisions; and Army deployment rotational requirements. These data came from Army-supplied personnel databases, deployment schedules, HRC rules, and stop-loss protocols, in addition to the stop-loss variations proposed by DoD and enumerated earlier.

Day-by-Day Rotation Simulator

- **Accesses soldiers and decides/tracks personnel assignments, promotions, deployments, separations**
- **Observes personnel rules for first-termers, retirements, CONUS vs. OCONUS tours, travel, stabilization periods, and movement fences**
- **Replaces soldiers in units by looking system-wide at MOS, grade, and PCS eligibility**
- **Configures units using authorizations, manning rules, and deployment and combat training center priorities and demands**
- **Provides comprehension outputs for immediate results and enhanced postprocessing**

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Central to the model is a large-scale discrete-event simulator that follows the careers of individual simulated soldiers, from accession through basic training, initial assignment, successive station changes, deployments, promotions, and, finally, separation. It observes the rules for assignments during the soldier's first term, prior to retirement, and following returns from deployments. The simulator looks across the entire Army for appropriate and available replacements when a soldier prepares to vacate a station, and it carefully adheres to varying manning rules for units (ARFORGEN cycles versus individual replacement for some units). Order stabilization periods are included for soldiers when they are ordered to their next stations, and the simulator accounts for travel times between assignments. It also includes minimum required times on station prior to deployment or PCS and specified training periods for deploying units. A log of all relevant decisions regarding each soldier's assignments is maintained for postprocessing and performance measurement. Snapshots of system conditions are used to identify unit conditions, including the deployability status of individual soldiers in each unit, their PCS availability, and the extent to which each rotational demand is being satisfied by assigned units. Decisions regarding needs of the system, each unit, and individual soldier are made multiple times per day; each simulation run accounted for 20 years of such days to achieve and measure the steady-state performance of each proposed scenario.

The simulator postprocesses the logs and results can be presented in a variety of ways. For this study, the many individual assignments and movements (recorded in a compacted file of a gigabyte or more per case) were retrieved through a series of Microsoft Access queries, and the results were then summarized and depicted graphically using Microsoft Excel. Other summaries were obtained using specialized code developed in C++ for processing the simulation event history. Examples include the probability distributions of unit on-hand levels, deployment tempos for individuals, and other career characteristics.

General Description of the Simulation Model

The model simulates personnel assignments throughout Army careers and is designed to capture the major effects of varying Army policies and practices that influence the movement of personnel. It is also designed to run in a reasonable amount of time; a typical run, simulating movements for a given MOS in the Army over a period of 20 years, takes less than half an hour. Simulating such long periods does not suggest that 20 years of real Army activity can be predicted, but it serves to put a particular Army configuration into a steady state, which allows a statistically robust comparison of operating performance versus alternative configurations. The steady state achieved here is one in which accessions and departures have been balanced and proposed deployment rotational demands repeat—a type of regenerative condition that is important for the statistical underpinnings of the results. When the system operates for a long stretch of simulated “time,” it allows the analyst to observe and measure a large number of soldiers’ careers that are subjected to the same general situation. In other words, 20 years of simulated careers in a steady-state condition helps the analyst identify the expected behavior of the system in any given short or long real-world period if the tested policy were adopted. More specifically, the simulation uses Monte Carlo sampling to determine numerous features of each soldier’s career (e.g., a probabilistically generated career length), based on real Army data. As with other sampling approaches, to avoid solution sensitivity to the randomness of this process, many such careers must be simulated and outcomes statistically synthesized into the expected performance of an existing or proposed scenario.¹

The model requires high-end Microsoft Windows®-based computers with user input controlled by a Microsoft Excel workbook that stores and organizes thousands of variables on more than 100 worksheets per case. The model was implemented in Extend 6®, as well as its successor version, ExtendSim 7®, an object-oriented simulation environment and language developed by Imagine That Inc. Despite the commercial system starting point, the model required extensive modifications of the Extend/ExtendSim system blocks to accommodate the tens of thousands of lines of custom code. The extensive output generated by the simulation runs was then analyzed in Microsoft Access, as well as with custom routines developed in C++. In fact, the stylized structure of the simulator outputs allows any number of postprocessing approaches. When test problems are small enough, even spreadsheet programs can be employed; certainly, other data analysis tools, such as SAS, Oracle, and R, could be applicable.

The model adheres to both the rules governing individual personnel and the needs of units. As noted earlier, the model simulates the demands for, and the movement of, active-duty enlisted personnel in a steady-state Army. Such demands are related to the need to assign soldiers to forces outside the continental United States (OCONUS) and the table of organization and equipment and table of distribution and allowances (TDA) requirements of units in the continental United States (CONUS), as well as the need to replace soldiers who separate from the Army. The model also simulates the deployment of eligible soldiers with their units to overseas conflicts and other contingency operations or to combat training centers (CTCs).

¹ This does not suggest that dynamic conditions and transformations cannot be studied with the approach. A multiyear run *can* represent a multiyear real period—with rotational demands changing, for instance, as conflicts diminish or increase for the U.S. military. Similarly, force structure and rules can be changed over time and within a given run with further modifications of the approach. In these cases, regenerative properties dissolve and replications of the runs themselves must play a larger role in obtaining statistically useful sample sizes for valid performance predictions.

During a simulation run, the model tracks the characteristics of individual soldiers and key indicators of force readiness, such as unit fill and personnel turnover. It maintains many characteristics of individual soldiers, including time in service, grade, MOS, current unit assignment, current geographical location, time spent on current station, time since last deployment, knowledge of whether or not the soldier is in his or her first term of service (and, if so, how many PCSs have occurred during that term), time since completion of the last unaccompanied tour, time since last deployment, and time until ETS date. For units, the model strives to determine current on-hand levels for comparison to current home station and deployment needs. When a soldier with a given MOS and grade is lost to promotion, separation, or change of station, the resulting void is filled as quickly as possible by an eligible replacement from somewhere else in the system. This ongoing status monitoring of individuals and units is combined with adherence to personnel rules for determining soldiers' PCS or deployment eligibility.

A description of the programming logic details is beyond the scope of this document, but the model's specifications in terms of inputs and the requirements it meets via its outputs, presented in the next section, can provide some understanding of its operation. Results from further postprocessing depend on the problem being studied.

Simulation Model Inputs

Inputs to the simulation were obtained via extensive discussion with Army planners and analysts. They include the following:

Force Structure, Supply, and Local Rules

- MOS being studied (e.g., 11B)
- Major unit groupings (e.g., CONUS BCT, OCONUS long tour, Tier 1 deployers, TDA)
- For each major grouping:
 - Units, by name or index
 - Authorization, per unit
 - Initial on-hand level, per unit
 - Tour length (days)
 - Local deployment stabilization (days)—automatic “fence” (movement restriction) at arrival on (nonfixed-tour) station
 - Orders stabilization (days)—deployment fence prior to assigned PCS date
 - Post-assignment deploy stabilization (days)—fence at next station after tour on this station (e.g., after a given tour)
 - Fill rate target (percentage)
 - Minimum fill rate (percentage), to limit PCSs when unit is at low strength
 - Unit grouping location (CONUS/OCONUS)
 - Remaining days required to allow first-term PCS to a CONUS station
 - Proportion of MOS subject to deployment fence within units
 - Assignment precedence—search order for destination stations for PCS
 - ARFORGEN cycle specifications (cycle start dates, closing dates for new arrival searches, percentages retained from previous cycle, rules for keeping soldiers who are preparing to separate).

Additional PCS Rules

- First-term threshold (days)—defines “long” versus “short” first term
- PCSs allowed during short first term (under threshold)
- PCSs allowed during long first term (over threshold)
- First-term length distribution, for assigning first-term lengths to accessions
- Required remainder of first term to allow PCS to OCONUS
- Service days required for “full” retirement
- Remaining days in service needed to allow PCS before full retirement.

Flow Specifications and Distributions

- Accession stream (number on given days)
- Accession pipeline (number on given days)—represents soldiers arriving from basic training after initial startup
- ETS distribution, for assigning separation date to accessing soldier or soldier present at startup
- Time-in-service distribution at each grade level
- Promotion times (days since start of service) at each grade level.

Rotational Requirements and Rules

- For each deployment location/small-scale contingency:
 - Name or index
 - D-days (starts of rotations)
 - Stop-loss rule under study
- For each rotation:
 - Soldiers required (authorizations for a given MOS)
 - Principal supplying station
 - Preparation time (days)
 - Tour length (days)
 - First backup supplier, in case principal supplier cannot provide all required soldiers
 - First backup trigger—days prior to D-day when backup begins to provide soldiers for rotation preparation
 - Second backup supplier, in case other suppliers cannot provide all required soldiers
 - Second backup trigger—days prior to D-day when backup begins to provide soldiers for rotation preparation
 - Third backup supplier, in case other suppliers cannot provide all required soldiers
 - Third backup trigger—days prior to D-day when backup begins to provide soldiers for rotation preparation
 - Fourth backup supplier, in case other suppliers cannot provide all required soldiers
 - Fourth backup trigger—days prior to D-day when backup begins to provide soldiers for rotation preparation
 - Deployment time threshold (days)—defines “long” deployment for PCS fencing
 - PCS fence (days) after short deployment (under threshold)
 - PCS fence (days) after long deployment (over threshold)
 - Accompanied fence (days) after long deployment
 - Unaccompanied fence (days) after long deployment
 - Deployment fence (days) before ETS or scheduled PCS

- Minimum time on station before deployment
- Redeployment fence mode—1 for day-for-day matching, 0 for stepped fence length after short, medium, or long deployment
- Deployment time threshold (days)—defines “medium” deployment in stepped mode
- Deployment time threshold (days)—defines “long” deployment in stepped mode
- Redeployment fence (days) after medium deployment
- Redeployment fence (days) after long deployment
- Minimum days since last deployment, before allowed training exercise
- Minimum days since unaccompanied tour, before allowed training exercise.

Direct Outputs of the Simulation Model

Details of each assignment decision, including soldier status, are recorded whenever the soldier

- Helps to fill the system at initial start-up of the simulation
- Accesses
- Completes basic training
- Arrives at any station
- Becomes assignable to another station
- Is promoted to another grade level
- Departs any station
- Separates from service
- Completes some prescribed minimum number of days in some on-station condition
- Has had any on-station condition interrupted for a personnel action (e.g., deployment)
- Extends to complete a fixed-length station tour (not deployment)
- Is chosen to deploy or prepare to deploy
- Is chosen to go to a CTC or to prepare to do so, as applicable
- Deploys
- Proceeds to a CTC
- Returns from a deployment (including aborted deployment training)
- Returns from a CTC
- Is stop-lossed.

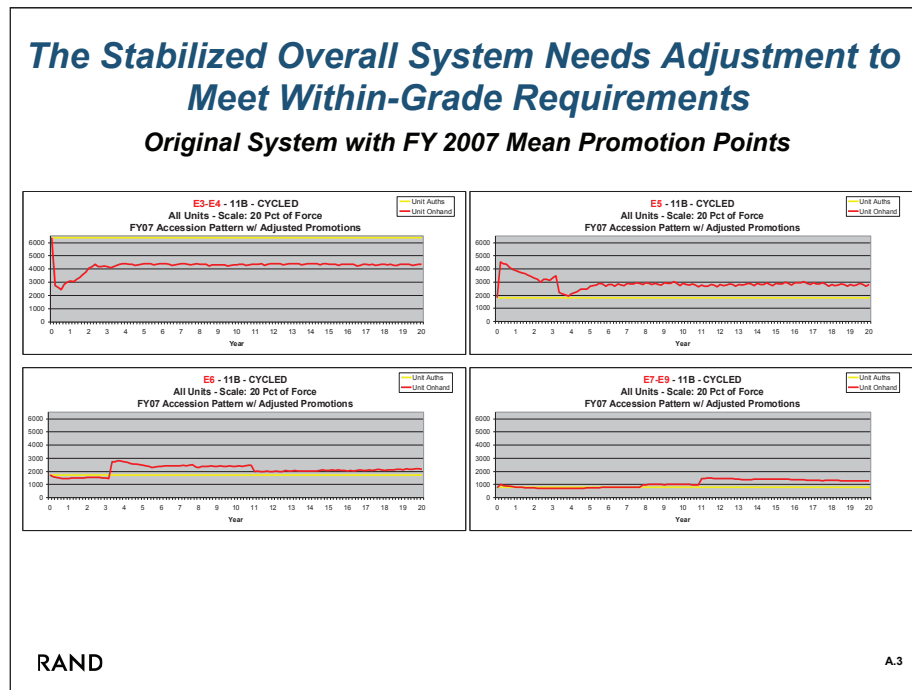
These results provide individual and unit information for any point during the simulation period, and the characteristics can be aggregated for the entire run.

For units, additional periodic reports detail unit conditions that characterize performance. These system “snapshots” are generated with a frequency specified by the user (typically monthly) and include the following, for each unit and grade:

- Authorized soldier level
- Total assigned soldiers (on hand and on orders to arrive)
- Number of soldiers in basic training (if applicable)
- Number of soldiers on orders to join the unit
- Number of soldiers actually traveling to the unit (per PCS)
- Number of soldiers on hand

- Number of soldiers on orders to leave the unit
- Unmet unit needs
- Fill rate
- Number and percentage of soldiers deployed
- Number and percentage of wartime-deployable soldiers on hand
- Number and percentage of on-hand soldiers who are now eligible to deploy
- Number and percentage of soldiers who will be eligible to deploy within 30, 60, 90, 120, 150, or 180 days (periods for future deployability can be set by the user)
- Number and percentage not deployable because of certain conditions (if rule is set):
 - insufficient time on station
 - closeness to prior deployment
 - type of prior assignment
 - impending promotion
 - impending ETS
 - first-term restriction
 - scheduled PCS
- Number and percentage not deployable within 30, 60, 90, 120, 150, or 180 days due to
 - insufficient time on station
 - closeness to prior deployment
 - type of prior assignment
 - impending promotion
 - impending ETS
 - first-term restriction
 - scheduled PCS
- Number and percentage of on-hand soldiers on orders to other units in the system
- Number and percentage of soldiers eligible to PCS to other units in the system
- Number and percentage of soldiers eligible to PCS to other units in the system within 30, 60, 90, 120, 150, or 180 days (periods for future eligibility can be set by the user).

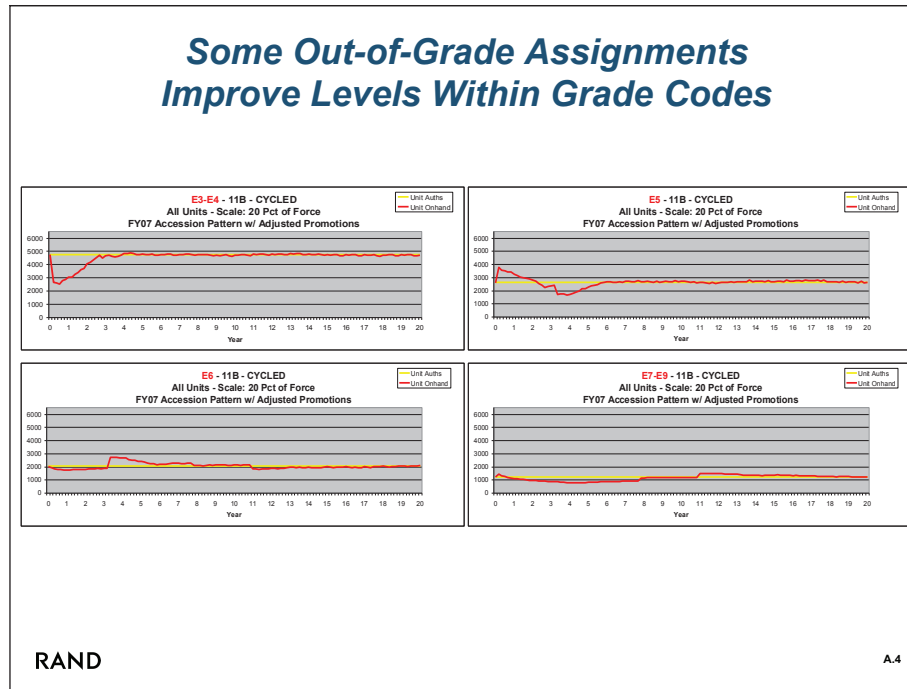
Establishment of a Steady-State Base Case



For a given set of historical or proposed accession, promotion, and separation patterns, a simulated system can be put into balance such that the number of soldiers within each grade range stabilizes. Depending on the timing of transitions between grades, however, the patterns do not guarantee that the grade-wise headcounts will match a particular set of authorizations. This can result from using single, mean values for some pattern parameters, such as time in grade, when more refined distributions are not available or practical in the program, despite its overall high fidelity. In reality, promotion decisions are individualized, and the needs of the system can even play a subtle and complex role that we do not attempt to engineer. We are, however, able to tune the system—for instance, allowing variation in the promotion times when no ancillary measures, such as pay, are involved—so that it provides a stable base case with an abundance of soldiers passing through each grade and contributing to needs consistent with the authorizations.

The slide shows a stable system for the 11B MOS at an aggregate, all-grades level, but with grade-wise on-hand counts not well balanced with needs. The authorizations for all codes, E-3 and up, are in compliance overall (as determined by analysis of similar data with grades aggregated), but there is still a deficit in E-3–E-4, and E-5 is oversupplied. Another round of more-focused grade balancing is therefore required.

As noted earlier, this approach can be used to develop a test-bed base case. However, the problems here go beyond the stop-loss issue and suggest how hard the Army works to put soldiers into the right positions.



This slide shows the system with the desired number of soldiers in each grade category. The system achieves the original goals of settling into a stable system in which approved movement rules place the right number of soldiers into grade-wise jobs and of keeping those numbers stable over an indefinite period, allowing abundant repetitions in the simulation for statistics gathering and experimentation with policy changes. Putting the future system into a steady state required some “management” actions involving the adjustment of some time-in-grade values and allowing some out-of-grade assignments, as is done in real life, to help settle the system into one with persistent end strengths close to projected authorizations. For instance, a soldier freshly promoted to E-5 might remain in an E-4 post for a short period of transition or replacement time. Similarly, additional E-3– and E-4–coded jobs were covered by those soldiers in the E-1–E-2 ranks who were clearly not in early training—again, a reality in the Army. Such adjustments occurred in the higher ranks as well, with the result being a stable balance between authorized need and the number of soldiers filling the authorized slots. To ensure comfort with any departures from what might take place in the real future, analyses were performed using different out-of-grade assignment patterns and extents of E-1–E-2 deployment to gauge the sensitivity of the current findings to such factors. The findings held, and the system depicted here proved to be a good representative for their presentation.

In any case, as stated earlier, the deployment demands and system end strengths supplied for the study are for an unrealized future scenario. They would be accommodated by HRC in the best way possible as they occurred in their anticipated, or some altered, form. The conditions would not remain indefinitely, and strict reliance on historical patterns could not sustain the authorizations indefinitely (as the model’s needed adjustment of historical patterns confirms). The Army is a dynamic system. Yet, examining its performance in the short term with the discrete-event simulation approach requires a stable simulated system operating for a long period of “time” to get meaningful, statistically valid results. We were therefore forced to find a set of promotion and job assignment patterns, close to historical ones, that could maintain

the system in equilibrium long enough for us to focus on the effects of specific policy changes, related only to stop-loss, while other reasonable conditions remained steady. This was done for each MOS examined. The resulting system, with stop-loss in place, will henceforth be referred to as the base case for each MOS.

This base-case system represents a working system from which stop-loss changes can be examined. It was forged into working order painstakingly, and its adjustments to any historical patterns have been outlined. Yet, as these adjustments might legitimately be questioned, the model was also used to test the system at the other extreme: without any adjustments of the type just described. Analytically, this is a loose approach in terms of challenging stop-loss. Such a system understates the importance of stop-loss; it has such poor performance in the future scenario that there is little to lose by making a policy change. The base case, on the other hand, is a well-performing system, based on the present real one and employing stop-loss; disturbances to stop-loss result in performance drops. In fact, the base-case comparisons may overstate stop-loss merits, but this is a preferable direction of error when looking cautiously toward change. In suggesting that ceasing stop-loss is possible, an understatement of the stop-loss case must be avoided, and our tightly prepared base cases oblige.

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